Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

In this issue—

- Food Texture Press — P. 1
- Jacketed Cool Room — P. 3
- Frozen Whole Crabs — P. 7
- Portable Reduction Plant — P. 11
- Marine Oil Chromatography — P. 17

— and 31 others

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FISH AND WILDLIFE SERVICE

Commercial Fisheries Abstracts

Prepared in the Branch of Commercial Fisheries

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The abstracts in this leaflet may be left in their present form; but it is suggested that to make the most efficient use of them, they be cut out on the lines designated and filed by the number in the upper left-hand corner of each. For a full description of this filing system see "Fishery Technological Abstract Card System" by Maurice E. Stansby and K. L. Osterhaug, Fishery Leaflet No. 232, obtainable free by request from Fish and Wildlife Service, Washington 25, D. C.

In addition to the regular abstracts, there is included a bibliography of references of secondary importance (without abstracts). These may be cut off on the lines designated and pasted on standard 3 x 5-inch cards for filing.

Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0	General and theoretical	5	Vitamins
1	Fish by species	6	Fishery byproducts
2	Fresh fish	7	Analytical Methods
3	Preserved fish	8	Composition
4	Oils	9	Miscellaneous

Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget November 23, 1956.

0.118 FOOD TEXTURE RAPIDLY GAGED WITH VERSATILE SHEAR-PRESS

Kramer, Amihud (University of Maryland, College Park)
Food Engineering 29, 57 (May 1957)

A new-model shear-press has been designed and constructed for measuring the texture of foods. The press is both versatile and accurate. It rapidly measures and records quality factors such as: (1) the maturity of raw peas, lima beans, and southern beans; (2) the firmness of raw and/or canned apple slices, beets, spaghetti, chicken, beef and shrimp; (3) the fibrousness of asparagus and string beans; and (4) the succulence of sweet corn and apples.

The new shear-press, which may be used in the field, on the processing line, or as a research tool, is a modification of a shear-press originally designed for checking the tenderness of canned lima beans.

Design. -- Basic components of this model are: (1) a sample box having upper and lower horizontal grid plates; (2) a test cell consisting of vertical stainless-steel blades that mesh precisely with the sample box; (3) a proving-ring dynamometer; (4) a fast-returning piston; (5) a hydraulic drive system providing automatic limiting pressure; and (6) measuring and recording attachments. The test cell is attached directly to the proving ring to eliminate a major source of frictional error; consequently, the force that is developed by the resistance of a food to shearing or compression is transferred directly to the measuring system. The piston can be moved at any rate of speed varying from 15 to 100 seconds per full stroke by adjusting the hydraulic drive. Primary hydraulic power is obtained from a gear pump driven by an electric motor on the standard unit. Where electric power is not available the motor may be replaced by an air-pressure accumulator.

(over)

ABSTRACTOR: Martin Heerdt

2.01 AMINES IN FISH MUSCLE III. SPOILAGE OF ICED EVISCERATED COD

Dyer, W. J.; Dyer, F. E.; and Snow, M. (Atlantic Fisheries Experimental Station)
Journal of the Fisheries Research Board of Canada 6, 403-413 (March 1946)

The path of spoilage in gutted cod stored in crushed ice was followed through the determination of bacterial count, trimethylamine, trimethylamine oxide and pH on various parts of the fish.

Experimental procedure. -- A preliminary experiment with iced fish showed large differences in the rate at which trimethylamine formed in composite samples of the muscle of the flank, back, and tail. An experiment was then set up to determine the relative spoilage rates in the various parts of the fish from the surface to the center.

Codfish that had been iced several days on board the vessel were held in ice at the laboratory, sampled at regular intervals, and tested for trimethylamine (TMA). In the nape section, the peritoneum decomposed rapidly as compared with the skin, in which no significant change in TMA was observed during the first three days. The TMA value of the central muscle rose quite rapidly, whereas the muscle next to the skin showed a later and smaller increase. Thus, there was a steep gradient from high TMA values in the peritoneum to low values in the skin. The evidence indicates that the principal source of infection and of spoilage is the lining of the visceral cavity.

In a second experiment, fish that had been on ice for only one day when received were immediately surrounded with crushed ice in a box covered with wet sacking and were kept very well iced throughout the experiment. The results of the examination of fish removed after 1, 10, 16, and 20 days are shown in table 1.

Conclusion. --The authors conclude that the products of bacterial action and not the bacteria diffuse into the muscle. The central muscle remained sterile for some time even though the TMA had almost reached its maximum value.

(over)

ABSTRACTER: Kathryn L. Osterhaug

1.86 THE DUNGENESS CRAB INDUSTRY

Hipkins, Fred W. (Fishery Products Laboratory, Ketchikan, Alaska)
Fishery Leaflet 439, 12 pp. (May 1957) (Available free of charge from the U. S. Fish and Wildlife Service, Department of the Interior, Washington 25, D. C.)

The Dungeness crab (Cancer magister) is a large hard-shell crab measuring up to 10 inches across the carapace. This species of crab is considered to be a choice fishery product of the North Pacific Coast.

The fishery for Dungeness crab extends from San Francisco Bay in California to Prince William Sound in Central Alaska and provides seasonal employment for over 5 thousand people working in approximately 95 processing plants. Nearly a thousand vessels land about 28 million pounds of Dungeness crabs each year. The value of the investments in vessels, fishing gear, and shore plants is estimated to be in excess of 10 million dollars.

Dungeness crab are known to inhabit only sandy and grassy bottoms below the tidal range. Such bottoms are widely scattered along the coasts of Northern California, Oregon, Washington, and Southeastern and Central Alaska. The principal landing ports are San Francisco and Eureka in California; Coos Bay, Yaquina Bay, and Astoria in Oregon; Grays Harbor, Willapa Harbor, and Seattle in Washington; and Cordova, Petersburg, Kake, Hoonah and Ketchikan in Alaska.

Crab fishing. -- Crab pots and ring nets are the only types of fishing gear authorized for the commercial Dungeness crab fishery in the Pacific Coast States and Alaska. The fishery is carried on both in inside waters such as San Francisco Bay, Puget Sound and Prince William Sound, and in outside waters. Fishing depths generally range from 2 to 20 fathoms, but crab are occasionally taken at

(over)

ABSTRACTER: Kathryn L. Osterhaug

2.1121 THE GRANTON TRAWL (PART TWO) THE COD ENDS: SUPPORTING AND BOLCHING THE TRAWL

Garner, John
World Fishing 6, 62-63 (May 1957)

The cod ends are the most important part of the trawl, the strongest of the net pieces, and the part that needs regular inspection when in use.

Cod end construction. --Seventy-six meshes of double twine are set up and all of the batings are braided in the first 36 rows. Twenty-six batings are put in the cod ends altogether (13 batings in each selvedge), in the following sequence: four batings every third row, followed by two batings each second row, then six batings, again every third row, and to finish the batings, one on the second row.

The number of meshes across at this point is 50, and plain braiding follows until the whole length of the selvedge measures 29 feet.

One row of cod line meshes is also braided. These meshes are usually about 12 inches (6 inches on the double). The time used in braiding these meshes is usually wasted as they are customarily cut off and replaced using Italian hemp or flax twine, before the trawl is put into use.

Supporting the trawl. --After the netting sections of the trawl have been constructed, the trawl needs supporting in a manner similar to that needed by a sail--all around the edges with bolt rope. It also needs strengthening in various ways. Some strengthening is accomplished when the top and bottom halves of the trawl are joined together by the selvedges on either side of the trawl.

The other forms of supporting the trawl include bolching the trawl. Bolching is done by attaching a $1\frac{1}{2}$-inch rope (bolch) all around the mouth of the trawl, that is, along the flymeshes to the end of the other top wing; similarly from the end of the first lower wing along the flymeshes, across the bosom meshes and along the flymeshes to the end of the second lower wing. The net is joined on the

(over)

ABSTRACTOR: Kathryn L. Osterhaug

FOOD TEXTURE PRESS

DUNGENESS CRAB FISHERY

PATH OF SPOILAGE

TRAWL CONSTRUCTION

1.86

depths of 40 fathoms. The location of crabs is usually determined by the trial setting of ring nets in different depths of water.

The vessels used in crab fishing vary from 16-foot outboard-powered skiffs to 65-foot seine-type or otter-trawl vessels. The smaller boats generally confine their activities to inside waters. During recent years, some of the larger vessels have been traveling as far as 600 miles to the fishing grounds. These boats have built-in holding tanks supplied with circulating sea-water to hold the crabs alive.

Processing. -- Crabs are delivered alive to shore plants. Large crabs with claws and legs intact are usually processed whole for the fresh market trade. Crabs with missing legs or claws are processed for picking and the meat is marketed fresh, frozen, or canned.

Crabs selected for the fresh market trade are boiled in a brine solution (3 percent salt by weight) for 15 to 20 minutes. After cooking they are chilled in fresh cold water and the shells are brushed to remove any particles that may be clinging to the outer shell. The whole crabs are then ready for the market.

Marketing. -- Dungeness crab is marketed in three different forms: (1) whole crab, fresh or frozen; (2) fresh or frozen meat; and (3) canned meat. Approximately 85 percent of the total catch is now marketed fresh or frozen. Most of this is sold in states west of the Rocky Mountains, although a few individually packaged and frozen whole crabs are marketed in the Midwestern States and in some of the large East Coast cities.

More information about the catching, processing and canning of crab meat is found in Fishery Leaflets 85, 88, 374, and 419, and Separate No. 50, available free of charge from the U. S. Fish and Wildlife Service, Department of the Interior, Washington 25, D. C.

2.1121

bolch by staplings. Top and lower wings usually arrive on board the trawlers already bolched.

The main purpose of the belly lines is to take the main weight of the net when the trawl is towing. For this reason they must be seized-on with great care. The end of a coil of $2\frac{1}{4}$-inch circumference rope is obtained and a small eye splice is made (about 4 inches). Fifty meshes are then counted, starting from the selvedges across the 200 mesh end of the belly. When the 50th mesh is reached the halfer is followed down towards the selvedge and the belly line is joined to the selvedge with a needle of double twine. The second belly line is attached in a similar manner to the opposite selvedge.

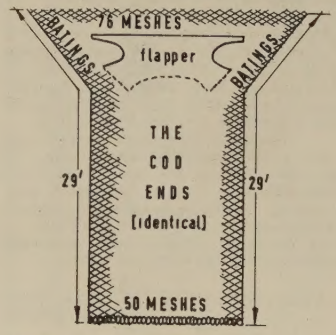


Fig. 1. The cod end

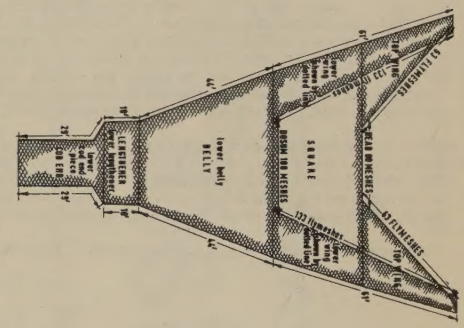


Fig. 2. Component net pieces drawn in their appropriate positions.

0.118 (Cross Reference: 7.89)

Operation. -- To operate the unit, a sample is placed in the box and the box is moved into the press. Pressure is now applied to the piston. The piston in turn transmits this pressure to the test cell to force it down and through the sample box. Resistance to the movement of the test cell is measured by subsequent compression of the proving ring.

Characteristics. -- The dynamometer used on the shear-press is similar to those used for calibrating test equipment. Fixed-point resolution of 0.5 percent may be obtained from individual calibration curves. Other rings are available for relatively soft materials and for relatively hard materials which require up to 5,000 pounds pressure. Pressure readings are taken from gages fitted into the proving ring or are produced electrically by the use of transducers. If an electrical measuring device is used, a recorder may be attached to show a time versus force curve for the entire stroke, rather than just a maximum-force reading.

History of the press. -- This new shear-press is the product of a five-year research project at the University of Maryland, in cooperation with Laboratory of Electronic Engineering, the Quality Evaluation Section of USDA's Agricultural Marketing Service, and a number of food processors who pioneered the use of the shear-press under commercial conditions.

2.01 (Cross Reference: 8.8)

Table I. Trimethylamine (TMA) as mg. nitrogen per 100 g., trimethylamine oxide (TMAO) as mg. nitrogen per 100g., bacteria (Bact.) as thousands per g. and pH in gutted cod stored in melting ice.

	July 12--1 day			July 21--10 days			July 27--16 days			July 31 20 days	
	TMA	TMAO	Bact.	TMA	TMAO	Bact.	TMA	TMAO	Bact.	TMA	TMAO
Nape											
Skin.....	0.87	31.	322	5.6	9.5	18,500	8.6	(-1.8)	2,000	9.2	(-5.6)
Under skin.....	0.45	66.	0	6.0	22.	0	14.5	(-2.0)	3	12.3	(-5.2)
Centre.....	0.35	76.	0	11.0	25.	0	20.	0	30	12.3	(-5.2)
Peritoneum.....	1.89		1100	25.		10,000	28.		100,000	18.	
Tail											
Skin.....	0.66	18.	140	0.82	11.	5,500	7.4	3.6	9,000	11.3	(-5.2)
Under skin.....	0.73	56.	0	1.1	32.	0	13.1	9.	2	15.	0
Centre.....	0.46	81.	0	1.1	65.	0	20.4	14.	0.9	20.	0
Middle											
Skin.....	0.70	21.	19	1.9	17.	24,000	9.6	0	450	18.	(-8.)
Under skin.....	0.43	71.	0	2.1	36.	0	14.	10.	32	24.	0
Centre.....	0.42	73.	0	1.3	66.	0	22.	5.	0	34.	(-2)
Backbone--											
forward.....	0.20	85.	0	5.2	61.	0	36.	2.	1	37.	0
kidney.....	0.32	85.	0	8.1	56.	0	39.	0.	220	39.	(-7)
Dorsal aorta...	4.0		0*	31.		1.7	33.		200		
	pH			pH			pH			pH	
Nape--centre....	6.5			7.0			7.0 - 7.2			7 - 7.3	
Middle--centre..	6.5			6.7			7.0			7 - 7.3	
Middle--skin....	7.0			7.2			7.2			7 - 7.3	

*Dorsal aorta at 6 days: Trimethylamine, 22; bacteria, 8000 per g.

2.113 HOW TO PROTECT YOUR BOAT FROM MARINE BORERS

Deed, William J.
National Fisherman 38, 13, 34-35 (June 1957)

The average loss to United States ships, docks, and bridges by marine borers is approximately one hundred million dollars. The vast fleet of fishing vessels suffers its share. Lobster pots, stakes for net markers driven into soft bottom, cars for lobsters, dock and floats also are food for these pests.

Some people have the mistaken idea that borers are not active in northern waters. It is only their shorter breeding season that makes it appear so. The breeding season lasts for only about a month in Arctic waters, about three months on the New England coast, in Virginia waters about six months, and in Florida it lasts the entire year. On the West Coast and Alaska the season lasts for about six months or longer.

Borers on the West Coast make holes as long as six feet, and three-quarters of an inch in diameter, whereas those on the Atlantic Coast usually bore tunnels about three feet long. Tests have proved that borers will cross seams or cracks up to one-eighth of an inch but not wider. In a given locality these pests may be very plentiful one year, and none may appear the following year.

When the tiny Teredo boring worm enters unprotected wood, his tail remains at the small hole on the surface while he grows longer and fatter as he eats his way into the wood. He must have sea water to live. The surface of the wooden structure may not indicate the presence of the Teredo even though the inside is full of tunnels and worthless as a structural member of the vessel.

(over)

ABSTRACTER: Kathryn L. Osterhaug

2.40 USE OF THE JACKETED ROOM SYSTEM FOR COOL STORAGE

Lentz, C. P. and Rooke, E. A. (National Research Council, Ottawa, Canada)
Food Technology 11, 257-261 (May 1957)

Purpose. -- The authors studied the effect of live heat loads due to the respiration of stored fresh produce on temperature and relative humidity in a jacketed room.

Experimental. -- The jacketed room was tested: (1) with internal heat loads ranging from 0 to 2500 British thermal units per hour (B. t. u. /hr.), (2) with 600 and 1200 cubic foot per minute (c. f. m.) rates of duct air circulation in both directions, (3) with forced air movement in the room, and (4) with 200 crates of celery hydro-cooled to 40° F. and stacked 4 crates high with 2-inch dunnage strips on four sides of each crate. Figure 1, omitted, shows a schematic elevation of the 10 x 10 x 20 foot (internal dimension) jacketed room.

Results with heat load tests. -- Relative humidity varied with the direction and the rate of air circulation in the jacket as well as with the heat load, figure 2, over. Bottom-to-top air circulation in the jacket caused temperature stratification and an increased temperature differential. With heat loads of 2400 to 2600 B. t. u. /hr. and bottom-to-top jacket circulation, forced air movement in the room raised the relative humidity from 69 to 76 percent with 600 c. f. m. jacket air circulation and from 75 to 80 percent with 1200 c. f. m. jacket air circulation. Maximum temperature variation with bottom-to-top air circulation ranged from less than ½° F. with no heat load to 2° and 3° F. with the maximum heat load or 2500 B. t. u. /hr. and jacket air-circulation rates of 1200 and 600 c. f. m., respectively. Maximum temperature variation with top-to-bottom jacket air circulation was less than 1° F. and air movement in the room reduced this variation to ½° F.

Results with celery. -- Celery, which is very sensitive to changes in temperature and relative humidity, remained marketable for 3 to 3½ months and averaged 1¼ percent weight loss per month in the jacketed cool room, whereas celery that was held in an ordinary cool room remained marketable

(over)

ABSTRACTER: Martin Heerdt

2.115 NEW SHIP HULL DESIGN ANNOUNCED BY CARGILL

Anonymous
Feedstuffs 29, 77 (May 25, 1957)

The president of a Minneapolis grain elevator firm recently patented a new ship design. This new design reportedly can increase the efficiency of power-driven water craft by as much as 20 percent. The new design in vessel propulsion combines (1) a jet-like effect and (2) a pinch-like effect to gain maximum propulsion through the water, see figure (over).

Design essentials. -- First, the new design employs a deep horizontal groove on each side of the vessel stern to channel water toward the propeller. The effect of the water pressure on the groove of the moving vessel simulates a pinching effect common to the effect produced on a watermelon seed as it is pinched between the thumb and forefinger. Second, the new design employs a propeller placed at the end of the two grooves so that the channels of water travel through the propeller before they converge. This arrangement adds additional forward push from the jet-like effect that is produced. Third, the new design employs a flat steel plate that extends from the keel of the vessel beneath the two water grooves and out beyond the propeller and rudder. This plate eliminates the drag that results from the digging-in action of the propeller and enables the vessel to use only water from the two sides. This is the water that produces the jet and pinch effect to obtain forward thrust.

Designs covered by this patent are equally applicable to ocean-going cargo vessels, passenger vessels, river towboats, and pleasure craft. Variations in the design make it suitable for single- or multi-screw vessels and for either shallow or deep water operation.

See illustration, over.

(over)

ABSTRACTER: Martin Heerdt

2.01 FACTORS AFFECTING TRIAMINEOXIDEASE I. INHIBITION OF THE ENZYME

Neilands, J. B. (Atlantic Fisheries Experimental Station, Halifax, N. S.)
Journal of the Fisheries Research Board of Canada 6, 368-379 (October 1945)

Introduction. --Suwa in 1909, was the first to show that trimethylamine oxide, which is common to nearly all marine fish, is reduced to trimethylamine during the bacterial destruction of fish muscle. Autolysis is involved to only a minor degree. The bacteria that possess the enzyme triamineoxidease use it as a respiratory catalyst in a system whereby trimethylamine oxide is activated as a hydrogen acceptor. Very little is known about the factors that affect trimethylamine formation by bacteria.

Objective. -- Reported here is an initial study of some of the factors that affect the formation of trimethylamine by bacteria.

Experimental. -- A 1-gram sample of cod muscle that contained 2.5 milligram percent of trimethylamine nitrogen was finely shredded by shaking it in 100 milliliters of sterile water in a dilution bottle containing broken glass.

The resulting suspension in the dilution bottle was plated out quantitatively on nutrient agar. A total of 55 organisms were isolated, 5 of which proved to be trimethylamine positive. Individual cultures of these 5 organisms were maintained for use as needed.

Washed cells grown on nutrient agar and centrifuged twice from physiological saline were used throughout the study. To carry out the reduction, the author filled Thunberg vacuum tubes aseptically with 1 milliliter of cell suspension, 1 milliliter of 0.1 molar trimethylamine oxide, 1 milliliter of

(over)

ABSTRACTER: Martin Heerdt

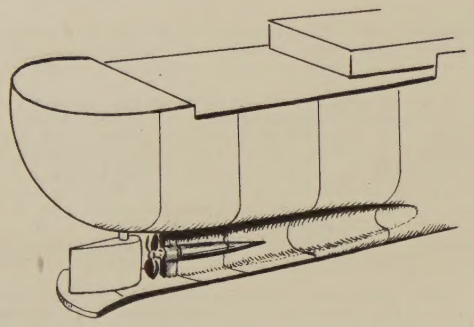
PROTECTION FROM MARINE BORERS

NEW VESSEL HULL DESIGN

JACKETED COOL ROOM

FACTORS AFFECTING TRIAMINEOXIDASE

2.115



NEW SHIP DESIGN

A newly patented ship design is shown in this picture. The grooves produce a pinching and jet effect said to give increased efficiency in propulsion by some 20 percent.

2.01

0.1 molar oxidizable substrate (sodium acetate, glucose, or other), 1 milliliter of phosphate buffer pH 7.0, and a solution of inhibitor or water to a given volume

After incubating the tubes for 10 hours at 37° C., the author determined the amount of trimethylamine that had been formed. Each culture was also incubated in tubes with water in place of trimethylamine oxide to prove that the yellow color obtained was the picrate of trimethylamine. The Evelyn photoelectric colorimeter gave a zero reading with these culture tubes.

Results. -- The experiments established the following data: (1) ammonium hydroxide and glycogen had very little effect on triamineoxidease, whereas indole, skatole, and hydrogen sulfide partially inhibited triamineoxidease. Certain specific dehydrogenase enzymes of washed cells of the bacteria used were not affected by treatment with hydrogen sulfide; (2) thioglycollate had no influence on triamineoxidease and trimethylamine formation, but a definite inhibition was obtained with cysteine; (3) cyanide and azide caused appreciable inhibition in concentrations smaller than those normally believed to inhibit specific dehydrogenases; and (4) non-reducing bacteria, including some proteolytic strains if present, did not affect measurably the reducing activity of a suspension of positive cells provided sterile muscle juice was made available as a hydrogen donor.

2.113

In addition to the Teredo, the best known of these sea-going termites are the Limnoria. Each individual is about the size of a grain of rice and looks like a louse. They are found in every climate and can eat into soft wood at the rate of an inch a year.

The Chelura, lobster-like in appearance, follows up the Limnoria, enlarging the small holes as they proceed into the wood. Another pest is the "putty bug" that eats the caulking out of boat seams; it is found in both fresh and salt water.

Dock pilings and under-water structures are best protected from borers and similar pests by creosoting. This treatment is not used to any extent on boats because of the added weight, odor, and dirt, as well as the fact that creosoted lumber cannot be properly painted.

Keeping every bit of the hull area under water well protected by anti-fouling copper paint, using a worm shoe on the bottom of the keel, and using substances impregnated with elements poisonous to worms are methods that will help prevent the attacks of marine borers. Copper paint prevents the boring worm from entering the wood, but every square inch of surface must be covered including where the wedges and small blocks are placed when the vessel is hauled out on the railway. Lead paint will not protect against marine borers.

In warm Southern waters the underbody of a boat should be thoroughly coated with protective copper paint more than once in a season. Keeping a boat in fresh water for a period of at least two weeks kills the borers, and when a vessel is hauled out of the water, they die in about 48 hours. Painting over the tiny holes also kills the borers by smothering them.

A worm shoe can be useful in preventing damage to the keel. If the worm shoe is properly fitted and a strip of Irish felt is fitted between the shoe and the keel, the felt chokes the marine borer as he eats his way through it.

2.40

for only 2½ to 3 months and averaged 2½-percent weight loss per month. Jacketed room temperature and relative humidity during the celery tests performed similarly during the heat load tests at an internal heat load of 500 B.t.u./hr. Relative humidity in the bulk of the room air was 100 percent, surface temperatures were constant, and moisture condensed on the walls and ceiling to fall on the celery and the floor.

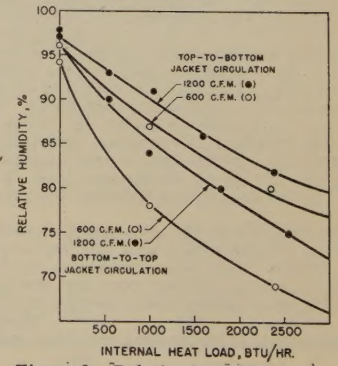


Figure 2. Relative humidity, calculated from lowest surface temperature for a range of heat loads in the room.

3. FISH PRESERVATION

Biegler, P.
Fette Seifen Anstrichmittel 58, 450 (June 1956) (Hamburg, West Germany)
World Fisheries Abstracts 8, 33-34 (March-April 1957)

Various methods of fish preservation are briefly discussed.

Drying. -- Developed in northern countries, dried fish (e.g., stockfish) have found a wide market in many parts of the world. Rehydration before eating should be done carefully in slightly alkaline water for 7 days.

Drying and salting. -- A number of non-fatty fish are salted and dried after being boned ("Klipfish"). Artificial drying should be carefully controlled to avoid the formation of a salt crust, which would impede further drying, and to avoid too great a heat, which would render the protein indigestible, hinder rehydration and produce a tasteless product. Some tropical populations consume klipfisn in the dry state.

Smoking. --The way of salting (dry or brine salting, followed by a partial de-salting before smoking) should be carefully adapted to the type of fish--its dimensions, desired keeping properties and flavor. Two similar herrings, one of which is salted whole, the other after being boned and filleted, yield products of a very different taste. Since the natural smoking procedure can be replaced by, or combined with artificial drying, it is possible to introduce exactly the desired amount of flavoring smoke constituents, any deficiency of preservative action being compensated by a stronger salting and/or drying. This is, however, impractical with hot smoked fish, which in summer can be kept for a sufficient time in good condition through a rather high concentration of smoke constituents.

Salting. -- The author distinguishes between "hard" and "mild" and "cold" salting. In hard salting herrings, 30 to 35 kg. (66.1 to 77.2 lb.) salt is used/100 kg. (220 lb.) herring; the ultimate salt content of the brine is 25%, and that of the herring 18 to 19%. Mild salting is practiced for the fatty

(over)

ABSTRACTER: C. J. H. van den Broek

3.12 EFFECT OF AUREOMYCIN CHLORTETRACYCLINE IN THE PROCESSING AND STORAGE OF FRESHLY SHUCKED OYSTERS

Abbey, Anthony; Kohler, A. Richard; and Upham, Sidney D. (American Cyanamid Company, Princeton, New Jersey)
Food Technology 11, 265-271 (May 1957)

In this study, the authors have evaluated chlortetracycline (CTC) in concentrations of 1 to 30 parts per million (p.p.m.) for use in prolonging the fresh storage life of shucked oysters.

Experimental materials. -- Fresh oysters from Norfolk, Virginia, which were standards in quality, were commercially processed up to the flotation or blowing step, treated with CTC, packed into cans, sealed, chilled in crushed ice, shipped to the laboratory, and stored at 2° to 4° C. or in ice.

Experimental methods. -- In tests 1, 2a, and 2b, samples for bacterial counts were incubated at 10° C. for 20 to 24 hours before counts were made. To make a count, several oysters were homogenized with three weight volumes of sterile water, appropriately diluted, plated out in duplicate on nutrient agar, desoxycholate agar, and other media, and the plates incubated 2 days at 25° C. or 1 day at 37° C., depending upon the media, and counted. Values for pH were obtained with a Beckman model G glass electrode meter. CTC content was evaluated by the methods of Broquist and Kohler (1953-54), Dornbush and Pelcak (1948), and Grady and Williams (1953).

Results. --In test 1, oysters were held in open ½-pint cans in concentrations of CTC ranging from 1 to 30 p.p.m. for 18 days. Differences in count between untreated oysters and oysters treated with CTC were very pronounced after 10 and 14 days at 2° to 4° C. Comparatively lower counts were evident in the CTC treated oysters as early as the 14th day. CTC treatments at 5 and 10 p.p.m. appeared effective, whereas treatments at 1 p.p.m. appeared to be less effective. Bacterial growth after 7 days was significantly retarded in the 5, 10, 20, and 30 p.p.m. treated oysters, whereas untreated oysters contained over 100 million colonies per gram. Organoleptically, the untreated and treated oysters remained acceptable, respectively, for 7 and 14 days.

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ABSTRACTER: Martin Heerdt

3.19 POSSIBILITIES OF IRRADIATED FOODS POINTED UP BY EXPERIMENTAL MEAL

Anonymous
Quick Frozen Foods 19, 44-45, 156 (June 1957)

A luncheon of irradiated foods recently served by the army included shrimp cocktail, parsley-buttered potatoes, broccoli with Hollandaise sauce, cabbage salad, hearth rolls, strawberries, and date-nut bread. Also available for sampling were irradiated peaches, bacon, ground beef, coffee cake, frankfurters, carrots, orange sections, and tunafish.

Food irradiation is still in the experimental stage. There is, however, hope that in time irradiation will take its place alongside of canning and freezing as a commercial reality. Irradiation is expected to supplement rather than substitute for today's preservation processes.

In the radiation process, electrons or gamma rays are sent through the food in approximately the same manner in which human beings are X-rayed. The microorganisms are killed without heat being produced to cook the food. As long as the food is kept in an airtight package it will remain sterile. However, enzymes, which are inactivated by freezing, have a degree of immunity to irradiation.

The amount of irradiation that is required to kill bacteria in certain food is such that it sometimes produces undesirable side effects. These include the development of off-flavors and off-odors. Much of the laboratory research conducted to date has been aimed at the problem of how bacteria can be killed without the development of side reactions.

The possibility that quick-freezing may aid here is indicated by the observation that irradiating

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ABSTRACTER: Kathryn L. Osterhaug

3.231 VERTICAL-PLATE FREEZER OFFERS EFFICIENT HEAT TRANSFER

Anonymous
Food Engineering 29, 166 (May 1957)

A new continuous vertical-plate freezer has been designed and constructed to offer maximum heat exchange for any given refrigerant temperature and velocity. This freezer provides automatic feed and discharge of carton-packed foods, and reportedly does not require an insulated enclosure for efficient operation at ambient temperatures. The efficiency of the freezer is attributed to an advanced design that utilizes 100 percent of the of the conductive surfaces and eliminates distortion of cartons. Adjustable features of the freezer include: (1) time of freezing cycle, (2) pressure between plates and cartons, and (3) the size of the cartons.

Operation. --Horizontal tiers of packages are fed mechanically into the top of the freezer from a "ready" channel positioned above each package column. The shearing action of the -40° F. ammonia-refrigerated plates permits entry of unfrozen cartons at the top of the freezer and discharge of frozen cartons at the bottom of the freezer. These plates remain open only 3 seconds for receiving and discharging cartons. Exposure of the refrigerated plate surfaces to air is thereby minimized to permit operation at ambient conditions. Packages remain under pressure between the plates during freezing to provide rapid heat transfer and to prevent frost accumulation. The 3-second cycle in brief is as follows: (1) plate pressure is hydraulically released to allow free movement of cartons downward between the plates; (2) cartons drop one tier at a time as a new row of cartons is loaded from the top; (3) plates close and rise to discharge the bottom tier.

Vertical-plate freezers are available with 5 to 9 plates for handling 4 to 8 rows of cartons. A 9-plate freezer will accommodate 15 tiers of pint ice-cream cartons in 8 rows of 42 cartons per

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ABSTRACTER: Martin Heerdt

TYPES OF PRESERVED FISH

AUREOMYCIN FOR FRESH OYSTERS

FOOD IRRADIATION RESEARCH

VERTICAL PLATE FREEZER

In test 2a, equal volumes of water containing CTC at concentrations of 5 and 10 p.p.m. and oysters were evaluated in sealed ½-pint containers at 2° to 4° C. over a 24-day period. Bacterial growth after 10 days was retarded in treated oysters, whereas growth in untreated oysters exceeded a count of 7 million per gram. Organoleptically, the untreated oysters were slightly off on the 10th day (pH 5.6). The treated oysters in 5 or 10 p.p.m. CTC were free from off-odors (pH 6.0) and remained acceptable until the 17th day. Residual CTC levels were 4.4 and 8.3 p.p.m., respectively.

In test 2b, oysters were packed as in test 2a, but in friction-top gallon cans, and shipped commercially in crushed ice from Norfolk to Boston and back to Princeton. Bacterial counts showed, without pre-incubation, 700,000 colonies per gram in the untreated oysters and 70,000 colonies per gram in the treated oysters after 12 days. By the 12th day the untreated oysters had 40 million colonies per gram and were no longer organoleptically acceptable.

In test 3, oysters were prepared as in test 2a except that CTC was used as a dip at 2, 3, or 4 p.p.m. for 5 minutes; at 10 p.p.m. for 2 minutes; and at 20 p.p.m. for ½ minute. Oysters were packed in sealed 1-pint cans, held at 2° to 4° C., and not pre-incubated. Bacterial counts for untreated and treated oysters were, respectively, at 6 days 8 million and 16,000 to 150,000 per gram and at 10 days 200 million with off-odors and 23,000 to 200,000 per gram with acceptable quality.

In test 4, oysters were packed untreated and treated with 1 and 2 p.p.m. CTC sealed in ½-pint cans, and stored in crushed ice. Bacterial counts for the untreated and treated oysters were, respectively, at 13 days, 4 million with off-odors and 72,000 to 180,000 colonies per gram with acceptable quality.

row, or a total of 5,040 pint cartons. With 800 sq. ft. of pressure-contact area, the freezer has a capacity of 600 gallons of ice cream per hour.

spring herring called "maatjes"; the ultimate salt content of the brine being 15 to 16%, of the herring 10 to 11%. "Cold salting," mainly used in the U.S.S.R., consists of adding crushed ice to fish during curing.

Freezing.--With the continuation of enzymatic processes even at low temperatures, the ideal preservation of the fresh fish taste is not always achieved.

Canning.--Some fish (salmon, tuna, mackerel, herring, etc.) can, after the sterilization, give acceptable products without any special condiment other than some salt; other fish, especially the non-fatty spp., call for a variety of special additives such as oil, spices, smoke constituents, etc. High sterilization temperatures, which are detrimental to the flavor, should be avoided by preventing the development of microorganisms of the fish during pre-treatment. The value of various sauces added to canned fish is discussed.

Marinating.--The ripening methods developed by the author and known as the "Pebema" treatment has found increasing application in Germany. Herring fillets are brought into a mixture of 7% acetic acid and 14% salt to which 0.015% hydrogen peroxide is added for bleaching. Although unfit for direct consumption, this mixture has sufficient preservative action to keep for months. The final acid content of the fillets is approx. 2.4%, their salt content 6 to 7%. Good aeration during the storage in barrels is necessary to prevent the development of Bacillus pebeatus, which may give the product a harsh flavor. Various spices and other condiments can be used to soften the taste of vinegar and salt in the final product, thus allowing reasonably high concentrations of these to be used, i.e., up to 2% acid and 5% salt. During the cold season, 1.8% acid and 4.5% salt is sufficient; by the use of other preservatives, these may be lowered to 1.2 and 3% resp. The marinating of cooked and fried fish is also discussed. The addition of sugar to marinades opens the way for an endless variety of highly valued delicatessen of very specific flavor. Gaffelbidder, heavily spiced in salt, sugar and some vinegar, should not contain more than 8% salt, higher concentrations being harmful to their flavor. For the production of "seelachs," coalfish fillets are salted with 80 to 100 kg. (176.4 to 220 lb.) salt/100 kg. fillet. During a 3-week period of ripening the glycogen of the fish muscle is turned into ethylidenelactic acid.

some foods while they are frozen or in the absence of oxygen minimizes the amount of off-odor development.

The laboratory findings now available indicate that irradiated foods suffer no significant nutrient losses. The loss of nutrients as a result of irradiation appears to be slightly less than that caused by heat treatment.

Research emphasis to date has been on the technical problems met with under controlled laboratory conditions. In future work, greater attention will be focused on the economic problems that must be solved before the process can become a commercial reality.

Scheduled for completion by October 31, 1958 is an ionizing radiation center to be built at the Sharpe General Depot, Lathrop, California. The center will include a high-power linear accelerator, which will irradiate foods by electron energy, and a nuclear reactor, which will irradiate foods with gamma rays.

Both of the units will be capable of sterilizing about 3,000 pounds of six-inch thick units of food per hour. The center will have a peak capacity of 1,000 tons of food per month.

3.18 SANITATION -- FOOD PLANTS

Mercer, W. A.
Food in Canada 16, Part 1, 32 (May 1956) Part 2, 40 (June 1956)
World Fisheries Abstracts 8, 19-20 (March-April 1957)

This paper discusses the various theories for the germicidal action of chlorine and the method of measuring its efficiency by developing a death rate curve.

Whether the chlorine is in the form of hypochlorite, chloramine or liquid chlorine, its germicidal power depends upon the concentration of hypochlorous acid, and is not always proportional to the amount of available chlorine.

Increasing the concentration of hypochlorite in solution raises the pH, which in turn reduces the concentration of hypochlorous acid, with the result that a solution containing calcium hypochlorite to give 1,000 p.p.m. "free" chlorine requires 3 times as long to kill the same number of bacteria as a solution containing 25 p.p.m. The former will have a pH of 11 to 12, and the latter 8 to 9. In lower concentrations of chlorine (up to 45 p.p.m.), the pH change of hypochlorite solutions is not enough to effect significantly the germicidal activity. It can be shown that at pH 11 only 0.03% of the available chlorine in a aqueous solution will be present as hypochlorous acid (HOCl); at pH 10 it will be 0.3%, at pH 7 it is 75.85%, and at pH 4 it is 99%. Data are given to show that at all pH levels used the hypochlorous acid concentration of chloramines was approx. $\frac{1}{3}$ that found for hypochlorite. The killing time for chloramine was approx. 12 to 15 times longer than that of chlorine gas or hypochlorite at all pH levels.

The effect of organic matter is also considered. Chlorine reacts with amines to form chloramine.

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 ABSTRACTER: C. H. Castell

3.30 SPOILAGE CAN START BETWEEN RETORT ROOM AND WAREHOUSE

Anonymous
Food Packer 38, 24, 40 (May 1957)

When spot checks of warehoused cases show occasional can spoilage in a high quality pack, there may be trouble in cooling or handling. This problem is confusing because spoilage seems to occur where no obvious cause can be found. The approach of the investigators, Leonard F. Gieseker, Frank Jewell, and Leroy V. Strasburger was from the standpoint of two separate problems: (1) sanitation in relation to cooling of containers and (2) sanitation of mechanical can handling equipment.

The introduction of high speed can handling equipment has brought many difficult problems, many of which are related to the sanitation program. After cans have been processed, it is recommended that they be cooled to 105° to 112° F. Too high a temperature may damage the color and flavor of the product and too low a temperature may cause the containers to rust.

From the aspect of sanitation, it is important to maintain a low bacterial count in the cooling water. Tests made by the National Canners Association show that cans cooled in water containing 100,000 bacteria per milliliter have five times as much spoilage as similar cans cooled in water with 100 or less organisms per milliliter.

To maintain low bacterial populations in the cooling canal (1) a free chloride residual of 0.5 to 2 p.p.m. should be maintained at the water outlet, (2) cooling canals and tanks should be drained and thoroughly cleaned at least weekly and, (3) rotating open coolers should be drained daily and cleaned and inspected at least once a week.

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 ABSTRACTER: Kathryn L. Osterhaug

3.235 INTRODUCING SOMETHING NEW IN FROZEN CRAB

Anonymous
Pacific Fisherman 55, 53 (June 1957)

A frozen fishery product to appear on the market for the first time this year is dressed, cooked, ready-to-eat Dungeness crab-in-the-shell.

To prepare crab in this manner, the carapace or shell is carefully removed from the crab, and the crab is then thoroughly cleaned and washed. The shell itself is also thoroughly scrubbed and both the crab and the shell are cooked separately. The back is then replaced so that the entire crab has a lifelike appearance.

After being weighed, the crabs are frozen and then given a heavy ice glaze to protect the exposed meat from dehydration. The frozen and glazed crab is placed in a paperboard "boat" with an absorbent pad underneath to absorb the glaze water when the crab is thawed.

The crabs are packed in heat-sealed plastic bags with the brand printed in color.

Packing and selling of frozen dressed or eviscerated Dungeness crab is a development of the process of putting whole frozen crabs in polyethylene bags, which preceded it by over a year.

All former efforts to sell frozen Dungeness crab in the shell have been hampered because consumers in many parts of the country do not know how to dress these crabs properly, or find the job distasteful. Eviscerated, cooked, frozen, glazed, and packaged crab appears to offer an effective answer to the problem.

 ABSTRACTER: Kathryn L. Osterhaug

3.3343 NEW COMPOUND STOPS STRUVITES AND PREVENTS DISCOLORATION AND SOFTENING OF CANNED SHRIMP

Anonymous
Southern Fisherman 17, 26 (May 1957)

A newly developed chemical additive may solve two of the most costly and troublesome problems faced by the shrimp canning industry. These problems are (1) the tendency of some canned shrimp to become discolored and (2) the formation on some canned shrimp of glass-like, crystalline deposits known as struvites.

The struvite-preventing compound was perfected after four years of research and has been proven both effective and harmless as a result of scientific feeding tests. The development was a cooperative effort between the School of Food Technology of the University of Massachusetts and members of the shrimp canning industry.

The new additive for canned shrimp is said to act as a "sequestering agent" which is a general term for substance that will pick up "heavy metals" and tie them up organically to prevent their action. In addition to preventing the formation of struvite, the additive firms the canned shrimp meats and prevents the development of discoloration.

Minute quantities of the struvite preventative are added to the shrimp before the cans are sealed. It can be prepared either in the form of salt tablets or in bulk.

 ABSTRACTER: Kathryn L. Osterhaug

GERMICIDAL ACTIVITES OF CHLORINE COMPOUNDS

FROZEN WHOLE CRABS

CANNERY SANITATION

STRUVITE PREVENTION

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but this combined chlorine is still germicidal. When it combines with other organic compounds this activity is lost. Chlorine does not react with starch and most sugars and these do not effect its germicidal power. Using tomato juice as the source of organic matter, it was found, in the pH range of 6 to 8, that there was no advantage of chloramine over the gas or hypochlorite in respect to the effect of organic matter.

3.30

To keep the cooling canals as clean as possible, the exterior of the cans coming into the cooling canal should be clean. In some operations this might mean attaching can washing equipment at the discharge of the closing machine.

Another prevention measure for contamination from cooling water is by prompt drying. Water adhering to seams of cans that have been handled roughly may be drawn into the can. While yet warm, the sealing compound is somewhat soft and seams are slightly expanded. Under these conditions seams are more easily strained or damaged by handling than after the cans are thoroughly cooled and dried.

Can handling machinery should be kept in sanitary condition. This is not possible if the equipment cannot be cleaned readily. For this reason, the starting point in sanitation is in designing or purchasing equipment.

When cleaning machinery, all loose debris should be removed with a wire brush. Any rust deposits should be scraped as they hold moisture and dry slowly even during shutdown periods. Because of this problem, stainless steel is preferred to black iron.

Spilled food material should be removed immediately as most canned foods are excellent media for bacterial growth. Trackways that are slippery or slimy should be scrubbed with a brush and detergent solution. All equipment should be cleaned with water under pressure and mechanical cleaning equipment to remove adhering contamination. The use of bacterial agents following general cleanup is recommended.

3.336 HTST IS NEARING THE TOP

Ecklund, O. F. and Sognefest, P. (American Can Co., Barrington, Illinois)
Food Engineering 29, 58-61 (May 1957)

Outstanding new canning techniques that provide better food quality, longer shelf life, and continuous flow include (1) the agitating vacuum process for whole kernel corn; (2) the heat-cool-fill (HCF) process for chocolate milk, cream, and creamed soups; and (3) the modified heat-cool-fill (partial cool) process for flash processing of tomato juice.

Heat-cool-fill. -- Recent studies show that a much improved evaporated milk, with an adequate but limited storage life, can be prepared by the HCF process. However, the necessary stabilizer is not yet permitted under existing standards of identity. With this method the product is (1) sterilized by rapid heating and cooling during passage through a heat exchanger, (2) filled aseptically, and (3) sealed in sterilized containers. This method is the ultimate in that it permits use of the best method to heat and cool the product rapidly without any restrictions being imposed by the container.

HCF has been applied only to reasonably fluid products such as milk, pumpkin, creamed soup, cream style corn, and chop suey. Early studies with this process showed that it could improve canned foods, but no modifications of the process were found that would provide the desired storage life for evaporated milk. Cooperative research, however, did culminate in the commercial production of HCF processed chocolate milk. The HCF process as applied to tomato juice consists of a hot fill followed by a 3-minute holding period to destroy any recontamination. The equivalent of 0.7 minutes at 250° F. destroyed heat resistant organisms, controlled thermophilic spoilage, conserved labor, and was continuous. Cream style corn likewise can be greatly improved by HCF processing, particularly when it is packed in large size cans.

Pressure-filler-cooker (PFC) method. -- This method makes use of a number 1 high-speed vacuum-closing machine equipped with auxiliary chambers and adapted to maintain steam at 20 to 30 pounds per

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 ABSTRACTER: Martin Heerdt

3.60 NEW PERSPECTIVE ON FREEZE DEHYDRATION

Brockmann, M. C. (Quartermaster Food and Container Institute, 1819 W. Pershing Road, Chicago, Illinois)
Food Processing 18, 22 (May 1957)

Freeze-drying consists of freezing the product and then dehydrating it under high vacuum. Tests have indicated that virtually all products with a definite tissue structure can be freeze-dried with a minimum loss of natural quality after rehydration.

Products that have been freeze-dried include a variety of cooked and uncooked foods that can be combined as unit meals. High-quality meat, poultry, fish and seafood freeze-dehydrated products can be produced at a cost of eleven cents a pound. Although some lowering of this cost may result from the use of equipment designed for large-scale production, the process is inherently time-consuming and thus expensive. The process can be speeded up and made less costly by breaking the material to be processed into small pieces before dehydration; however, the resulting loss of texture is usually undesirable.

Advantages of freeze-dried products include (1) long-term stability without refrigeration, (2) 50 to 80 percent reduction in weight, (3) no freezing problem, that is, exposure of package to below freezing temperatures will not cause expansion of contents and rupture of container.

Precooked, dehydrated foods can be utilized in the field with very simple food preparation equipment. Hot water and a few minutes of soaking time is all that is required for preparation of the meal.

The military is interested in high-quality freeze-dehydrated products for solving problems that

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 ABSTRACTER: Kathryn L. Osterhaug

3.4 SMOKED FISH - CHEMICAL COMPOSITION

Morawa, F.
Die Fischwirtschaft 7, 281 (October 1955) (Bremerhaven-F. W. Germany)
World Fisheries Abstracts 8, 31-32 (March-April 1957)

The quality of brislings and their suitability for industrial use are determined chiefly by the amount of food in the intestines. In summer, the fat content of the fish is high and the gut is filled with plankton to such an extent that the fish deteriorates rapidly. Industry prefers brislings in spring when they feed little. In Norway, brislings caught in summer are left in the net long enough to make them empty their intestines.

The fat content of fresh and smoked brislings, imported into W. Germany from Denmark, was determined from Oct. 1951 to Oct. 1952 with the exception of April to July and in May some samples from the Baltic were substituted. Brislings of 12 to 13 cm. (4¾ to 5 1/8 in.) long were cleaned, weighed, smoked, weighed again, the fat and water content determined immediately, and the values compared with the corresponding figures for fresh brislings from the same samples (see over).

The figures for the fat content of both fresh and smoked brislings follow closely the seasonal changes and are determined by the amount of food absorbed. The values for the percentage of fat-free dry matter follow a different course; for fresh brislings the figures are fairly constant throughout the year (approx. 18%), but for smoked brislings, the figures show a variation in an inverse proportion to that of the fat content, i.e., the fattest autumn brislings have the lowest, the thinnest brislings of the spring the highest percentage of fat-free dry matter (mainly protein). This divergence is caused by the fact that the fatty autumn brislings lose approx. 18 to 19% in weight in smoking, the spring brislings 22 to 24%. The fat content is changed very little by smoking.

See table, over.

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 ABSTRACTER: C. J. H. van den Broek

4.0 REPORT OF THE LITERATURE REVIEW COMMITTEE - 23rd ANNUAL REVIEW OF THE LITERATURE ON FATS, OILS, AND DETERGENTS

Piskur, M. M. (Swift and Company, Chicago 9, Illinois)
The Journal of the American Oil Chemists' Society 34, 222-239 (May 1957)

Production processes. -- Yellowish-brown fish oils were refined by treatment with dichromate and acid followed by neutralization with lye (Fukushima and Tanaka--Japan 335-'55). (Okura et al. -- Repts. Research Lab. Nippon Suisan Co. 7, 39, 43, 46, 51, 57, 67, 70, 72, 84, 89, 92, 95), determined the processing conditions for the Kvaerner and the Hartmen render used on whale factory ships, that give optimum yield and quality of product at least cost. A liquid wax was produced from crude whale oil by counter-current fractionation with a liquefied normally gaseous hydrocarbon (Brabets et al. -- U.S. 2,730,538). The alcohols derived from this wax were fractionated into saturated and unsaturated components through utilizing a differential solubility of these in liquid ammonia (Itai--Repts. Res. Lab. Nippon Suisan Co. 7, 97, 102, 108; Sakai--Japan 1369-'55). Solvent fractionation with ammonia in this work also permitted the separation of a kitol-vitamin A concentrate from whale liver oils.

Other methods described for concentration of vitamin A were based on industrial molecular distillation (Tsujino and Kikuchi--J. Agr. Chem. Soc. Japan 27, 437) and on a commercial process of separating the unsaponifiable matter and recrystallizing this from methanol (Ishizaka and Hori--Japan 1384-'55). A means of converting vitamin A concentrate derived from fish oils to a deodorized product comprised dissolving in cottonseed oil and distilling with a molecular still (Suzuki--Japan 6438-'54). The first fraction is dark and odorous, hence is discarded.

Hydrolysis of fat with some fractionation according to degree of unsaturation was accomplished by partial saponification in steps and removing the soaps after each step (Higashi et al. --Japan 226-'55). The unsaponifiable material of foots obtained from refining cod liver oil were distilled under

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 ABSTRACTER: Martin Heerdt

HIGH TEMPERATURE FOOD STERILIZATION

QUALITY OF BRISLING

FREEZE-DRIED FOODS

1956 LITERATURE REVIEW ON OILS

3.4

Composition (%) of Fresh and Smoked Bristlings

1951/52 Month	Fresh Bristlings			Smoked Bristlings		
	Fat	Water	Fat-free dry matter	Fat	Water	Fat-free dry matter
October	17.6	63.9	18.5	19.8	56.1	24.1
November	17.1	63.8	19.1	19.4	58.4	22.2
December*	15.8*	62.6*	21.6*	19.0*	52.3*	28.7*
January	16.3	64.8	18.9	18.2	58.9	23.9
February	9.4	72.8	17.8	11.4	65.4	23.2
March	6.1	76.0	17.9	6.8	66.3	26.9
May	5.7	76.2	18.1	8.8	61.1	30.1
August	12.4	68.3	19.3	12.4	61.0	26.6
September	15.5	66.9	17.6	20.3	57.0	22.7
October	16.4	65.5	18.1	15.9	59.9	24.2

*Only one sample

4.0

vacuum to obtain a cholesterol concentrate (Sone--Japan 6882-'54). Cholesterol was obtained from cuttle fish oil by separation and distillation of the unsaponifiable material (Imai--Japan 227-'55), and by converting the whole oil to methyl esters and distilling (Marumo et al. -- Japan 979-'55; Miller and Berry--U.S. 2,729,655-6). Ethyl morrhuate was prepared by alcoholysis of cod-liver oil in presence of sulfuric acid as the catalyst (Palestrino and Guitian--Ion, Brazil 15, 478).

Products. --A method of preparing azelaic acid involved halogenating oleic acid, dehalogenating to form dihydroxystearic acid, and oxidizing this with chromic acid (Kobayashi and Miyazaki--Repts. Govt. Ind. Res. Inst. Tokyo 49, 73, 78). The fatty acids derived from sperm whale oil yielded about 24 percent dibasic acids and 28 percent pelargonic acid (Ibid. 82). Sperm oil intended for sulfonation for use in tanneries should be submitted to a "winterization" process to lower the melting point to -8° C. (Pilc--Kozarstvi 5, 168). To improve the properties of fish oils for oiling leather they were inoculated with fat splitting bacteria and aerated until the acidity was increased to over 10 percent (Bruzac--Fr. 998,607).

A hydrocarbon oil anticorrosive coating contained fatty acid ester of dextran to improve adherence (Hiler--U.S. 2,756,156). A similar product contained calcium soap of fish oil fatty acids, polymerized isobutylene, and microcrystalline wax to thicken the product (Cooke and De Hoff--U.S. 2,758,981). Aluminum soaps of certain mixtures of the hydrogenated fatty acids of fish oils were 3 to 4 times as economical in the formation of gels as conventional aluminum stearate (Mason et al. -- U. S. 2,758,123).

The accelerating effects of cobalt, manganese, and lead driers on the polymerization rate of linseed and tuna fish oils (Lopez- Morales and Doadrio--Anales real soc. espan. fis. y quim., Madrid 51B, 541) have been evaluated. Several other means are used to convert oils with poor drying properties to drying oil uses. Heating herring and sardine oils with di-tert.-butyl peroxide increased molecular weight and viscosity without increasing unsaturation, retarded darkening upon heating, reduced fishy odor, and accelerated drying to give harder films (Tess and Dannenberg--Ind. Eng. Chem. 48, 339). Soybean, milkweed seed, and fish oils were submitted to selective acidolysis by heating in the presence of anthraquinone with distillation of the liberated acids to yield a residue of drying oils which set to firm films (Lanson--J. Am. Oil Chemists' Soc. 33, 68).

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square inch. Food forced through a spiral tube is heated to 250° to 270° F. and passed into a can in the filling section of the closing machine. Then the filled can is discharged into a chute, rolled along a short track,held to complete sterilization of the product, valved out of the sterilization chamber, and cooled in water. A fairly acceptable evaporated milk could be prepared by the PFC method.

Agitated-can (AC) method. -- This method provides an increased rate of heat transfer as compared with conventional methods of processing by agitating the filled cans during processing and cooling. The method involves end-over-end rotation of the cans in the reel of an experimental Fort Wayne retort. The quality of milk sterilized by this method nearly equalled the quality of milk processed by the PFC method. Neither method, however, produced evaporated milk with the desired storage stability.

Sterilization and closing (SC) method. --This method is designed to handle discrete particle foods such as whole kernel corn, peas, diced beets, shrimp, and similar foods. The food to be processed is filled into cans. Then this food is held in the can by a perforated plate, and the can is inverted and subjected to jets of steam in a chamber. This steam rapidly heats the food to the temperature of the chamber after which the cans are turned upright, filled with hot sterile brine, sealed, held at chamber temperature to complete sterilization, and water cooled. High quality packs of whole kernel corn, diced vegetables, green beans and wax beans are produced by this method. Some spoilage, however, may result from recontamination through the top doubleseam owing to softening of the non-heat resistant sealing compounds. Product spoilage and mechanical difficulties with the SC machine have suspended work on this project.

Agitated-vacuum (AV) improvements. -- Agitation during the processing of vacuum packed vegetables that contained 1 or 2 ounces of brine greatly increased the rate of heating. The three types of agitation studied were (1) continuous end-over-end agitation, (2) continuous axial agitation, and (3) intermittent axial rotation. Corn,vacuum packed into 307 x 400 size cans and retorted at 250° F. had a calculated process time of 12 minutes by continuous agitation, 14 minutes by intermittent agitation, and 35 minutes by conventional still cook. Important improvements in quality were obtained with the AV method because of a reduction in processing time.

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arise during operations in which the facilities for food preservation are either non-existent or grossly inadequate. The low density of these products become of increasing advantage as supply lines become extended or air shipment or dropping by parachute is required.

Freeze-dried products should also be of interest to campers and to those going boating. The production cost of eleven cents a pound is not considered excessive for such specialty items, particularly if applied to the more costly food products.

3.4 SMOKING METHODS AND EQUIPMENT - MECHANICAL SMOKING

Anonymous
Food Trade Review 26, 17 (May 1956) (London)
World Fisheries Abstracts 8, 31-32 (March-April 1957)

The Kvaerner automatic drying and smoking oven has been specially designed for hot smoking of fish and meat products but may also be used as a drying oven in connection with cold smoking chambers. A new oven installed in a Whitstable (U.K.) cannery handles brislings and sild sardines in a continuous process. The fish are automatically impaled on thin steel rods fitted into frames: each frame holds 28 rods and has a capacity of over 600 fish. Trolleys loaded with the frames and rodded fish are conveyed by chains at one of a number of selected speeds through the drying section and then through the smoke section, the latter being directly connected to the drying section. The speed of the trolleys, the volume of dry air and the intensity of the smoke are all adjustable according to the type of product being handled. The oven is fired with oak logs. It is equipped with large fans and flues arranged to serve 3 compartments, the first for drying, the second for smoking and the third for cooking. The whole oven system operates below atmospheric pressure, thus improving working conditions in the factory by obviating leakage of smoke. The oven will deal continuously with 80,000 fish, processing them in 40 to 75 min., depending on their size, as they pass through it.

A similar plant recently installed in a large Danish meat cannery has a daily output of 200,000 to 250,000 smoked Vienna sausages in addition to other types of smoked meat products. The manufacturers claim that the use of this oven system results in a 2% reduction in wastage compared with the output from more conventional types of smoke chambers.

 ABSTRACTER: A. C. Jason

6.131 PORTABLE REDUCTION PLANT OPENS TRASH FISH POSSIBILITIES

Anonymous
Southern Fisherman 17, 79-80 (May 1957)

A Baltimore, Maryland company, at the request of the United States Fish and Wildlife Service, has designed a portable reduction plant capable of being mounted on a conventional semi-trailer and moved from one location to another. The portable reduction plant was originally designed for handling rough fish seined out of fresh water lakes because the volume from any one lake would not justify a permanent installation.

Starting with a conventional tandem-axle semi-trailer 8 feet wide by 35 feet long, rated at 40,000 pounds, the engineers designed their equipment not only to fit on the trailer, but also to operate while so mounted. The equipment can also be mounted on a small barge. Space is provided for a 40 KW electric generator so that the installation is independent of shore power.

The portable reduction plant was designed to process 1 ton per hour of rough fish that range in size from 2 to 5 pounds. The first step in the reduction process is to reduce the fish to workable size by chopping or shredding and then dehydrate it without significant damage to the quantity or the quality of the protein and other nutritive factors found in the raw fish.

Because neither rough fish nor trash fish has any appreciable oil content, no arrangements have been made for recovery of oil. Instead of passing to a continuous cooker after shredding, the fish passes to the hot end of the dryer by actually passing through the center of the dryer itself. Here the fish come in contact with heat while traveling through the cooker "tunnel" and arrive at the hot end of the dryer in a precooked condition, ready for drying.

The actual evaportaion of moisture takes place in a patented dehydrator that is designed around the principle of varying diameters. The material enters the hot end of the shell where drying takes place at a relatively high rate, then passes to the center section where the drying rate is somewhat

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 ABSTRACTER: Kathryn L. Osterhaug

4.15 SQUALENE CONTENT OF VARIOUS SHARK LIVERS

Heller, J. H.; Heller, M. S.; Springer, S.; and Clark, E.
Nature 179, 919-920 (May 4, 1957)

The authors attempted to obtain carbon-14-labeled squalene by biological synthesis of squalene in the basking shark. These sharks are large in size--some are over 30 feet in length. Injecting carbon-14-labeled acetate into a shark and keeping the shark alive for 3 days to allow for adequate synthesis of squalene was a sizeable problem.

The authors finally decided to search for other sharks of a more suitable size that might also have a large amount of squalene in their liver oil. This search was made along the west and east coasts of Florida, the Caribbean, and the Gulf of Mexico. Each shark caught was killed and 15-gram samples of its liver were ground in a mortar with 30 grams of sodium sulfate. The mixture was extracted with chloroform, and subjected to an infra-red assay for the amount of squalene that was present.

Liver oil from both males and females of various ages, from different lobes of the liver, and from different portions of the same lobe were assayed for squalene. These assays showed no significant difference in the squalene content of the liver oil with respect to sex, size, or area of liver sampled.

Various elasmobranchs were caught for assay of their liver oils. The squalene content of these oils is tabulated on this card, (see over). Squalene appears to be a relatively uncommon constituent except in a few species in which it occurs in huge amounts. One of the squalene rich sharks, Dalatias licha, had considerable oil in its stomach which otherwise contained no undigested material. This

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 ABSTRACTER: Martin Heerdt

6.14 INCREASING SHELF LIFE OF FAT-CONTAINING FOODS

Milleville, Howard P., Stucky, B. N.; and Gearhart, W. M. (Eastman Chemical Products, Inc.)
Food Processing 18, 54-58 (May 1957)

Application to fish scrap.--Antioxidants reduced heating of dried fish scrap according to the results of tests made at a plant at Morehead, North Carolina. A fish oil solution of the antioxidant was applied to menhaden scrap as it left the direct-fired rotary driers at a rate of two pounds per ton (a 1 percent concentration based on the oil content). When the antioxidant was applied at other stages of processing, less satisfactory results were obtained. The antioxidant applied at other stages was probably lost by steam distillation during drying.

The temperature of the control, a 3-ton pile of untreated scrap, was 208° F. at the end of 15 hours and had to be turned to prevent spontaneous combustion. Apparently the drying "triggers" the oxidation reactions, and the use of antioxidants breaks up the chain reactions involved.

The temperature of the undisturbed, 3-ton pile of antioxidant-treated meal 15 hours after it left the dryer was recorded at 115° F., and 117° F. after 40 hours. Treated fish scrap bagged immediately after drying reached a maximum temperature of 109° F. at the end of 18 hours. The temperature of untreated scrap bagged immediately after drying reached 147° F.

In addition to controlling the heating of the meal, it is anticipated that added antioxidant would protect the vitamin A content of the meal and prevent the development of off-flavors.

 ABSTRACTER: Kathryn L. Osterhaug

SMOKING AND DRYING OVEN

SQUALENE CONTENT OF SHARK

PORTABLE REDUCTION PLANT

ANTIOXIDANTS FOR FISH MEAL

4.15

oil assayed 45 percent squalene. Occasionally, other species of sharks have been observed with their stomachs full of oil and without other undigested material. The source of this oil is unknown, as is the function or purpose of the large amounts of squalene in the livers of Dalatias licha and Centrophorus uyato.

Elasmobranchs	Squalene content of liver oil (percent)
Eulamia milberti	<1
Eulamia floridanus	<1
Eulamia falciformis	<1
Pterolamiops longimanus	<1
Carcharhinus leucas	<1
Sphyrna zygaena	<1
Sphyrna tiburo	<1
Isurus oxyrinchus	<1
Ginglymostoma cirratum	<1
Narcine brasiliensis	<1
Scyliorhinus retifer	<1
Etmopterus virens	<1
Negaprion brevirostris	<1
Galeocerdo cuvier	<1
Squalus cubensis	<1
Squalus fernandinus	<1
Dalatias licha	70
Centrophorus uyato	90

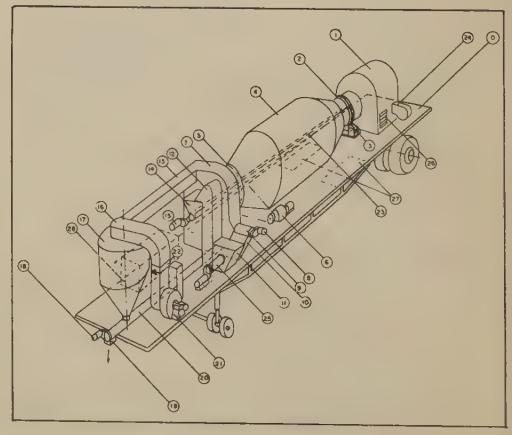
6.14

3.4

6.131

reduced to prevent damage to the meal, and finally to the last stage where the drying rate is considerably slower. It leaves the dryer in a commercially dried condition.

An idea of the route followed by the raw material can be obtained by referring to the accompanying drawing of the portable reduction plant. Raw whole fish enter the hopper at 11 and pass through the shredder, 25. An elevator, 12, takes the shredded material to a feed hopper, 14, which in turn feeds it into the precooker, 23, which moves it in the direction of the furnace, 1, through the precooker "tunnel." It enters the dehydrator shell, 4, at the hot end adjacent to the furnace and turns back toward the discharge breeching, 7, arriving there in commercially dried condition. It enters the exhaust duct, 13, and passes to the cyclonic separator, 17, whence it passes into the meal discharge screw, 20, and out via the meal discharge chute, 19, for bagging. In the case of shrimp hulls or other materials which are tricky to dry, recycling part of the material has been provided for in the design and can be readily done.



PORTABLE REDUCTION PLANT
TRAILER MOUNTED

6.193 CORN DISTILLERS DRIED SOLUBLES AS A SOURCE OF UNIDENTIFIED NUTRIENTS REQUIRED BY CHICKENS AND TURKEYS

Scott, M. L. (Cornell University)
Proceedings Distillers Feed Conference 12, 61-70 (March 13, 1957)

This paper discusses the evidence on the distribution of unidentified factors in various feed ingredients and attempts to establish minimum levels of distillers dried solubles and other unidentified factor sources in practical poultry rations.

A variety of unidentified factor supplements were tested singly and in various combinations, and evidence obtained indicates the existence of about 5 distinct unidentified factors. These factors have been described as (1) the fish solubles factor, (2) the distillers dried solubles factor, (3) the grass juice factor, (4) the unknown mineral factor (also present in distillers dried solubles), and (5) the protein factor. Evidence to support the existence of factors 1, 2, 3, and 4 has been presented in earlier reports of Scott et al. (1954), Norris et al. (1956), Morrison et al. (1955), Dannenburg et al. (1955) and Morrison et al. (1956). The existence of factor 5 depends upon the fact that the use of whole-protein materials in purified diets invariably promotes better chick growth than the growth which results if the protein is replaced by pure amino acids in the same quantities as shown by analyses of the intact protein.

Poult studies. -- Poults were maintained on a purified diet containing isolated soybean protein, cornstarch, and all of the known vitamins and minerals required by young poults. Evidence was obtained with this diet that the turkey poult has an even greater requirement for unidentified factors than young chicks.

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 ABSTRACTER: Martin Heerdt

6.195 BIOLOGICAL VALUE OF PROTEINS

Anonymous
Nutrition Reviews 15, 151-153 (May 1957)

Historical. --In 1946, H. H. Mitchell and R. J. Block evolved a system for protein evaluation based on amino acid content. They used whole egg as a standard and expressed the nutritive value of the protein as a "chemical score" equal to the greatest percentage deficit of an essential amino acid in the test protein. This composition analysis method underrated the value of a protein in comparison with its biological test value. The method was modified by B. L. Oser (1951) so that all of the essential amino acid "egg ratios" were integrated by the calculation of their geometric mean. H. H. Mitchell (1954) introduced a further modification by excluding arginine from the essential amino acids, and by including tyrosine in determining the "egg ratio" for phenylalanine.

Recent work. -- A. L. Sheffner, Gladys A. Eckfeld, and H. Spector (1956) devised an evaluation procedure in which consideration is given to amino acid release in the digestive process. Conditions were established for the in vitro digestion of proteins with pepsin (stomach enzyme), trypsin (pancreatic enzyme), and erepsin (intestinal enzyme). Pepsin digestion was carried on until about 30 percent of ingested reference protein (egg) nitrogen was available based on microbiological assay for the constituent amino acids. The patterns of the microbiologically available 9 essential amino acids, plus cystine and tyrosine, present in the pepsin-digests of proteins and in the completely hydrolyzed residues, were then determined for casein and for whole egg. Large differences occurred between casein and whole egg based on the amino acids released by pepsin. For example, the proportion of methionine in the pepsin-digest of whole egg was 23 times as great as in the pepsin-digest of casein. When the proteins were hydrolyzed to completion, however, the proportions of the 11 amino acids in the 2 hydrolysates were almost identical.

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 ABSTRACTER: Martin Heerdt

6.199 CHEMICALS AND FOOD PROCESSING

Mickelsen, Olaf (National Institutes of Health, Bethesda, Maryland)
Nutrition Review 15, 129-131 (May 1957)

Certain compounds used in food processing and then removed may leave a nutritional imprint upon the food by altering it in some way. Classic toxicologic procedures do not detect the action of these substances.

Ethylene oxide, which leaves a nutritional imprint upon foods, is currently being used for the fumigation of spices and a few other foods of relatively minor nutritional importance.

E. A. Hawk and O. Mickelsen (1956) investigated the deleterious effects of ethylene oxide on purified rations and showed that rats on these rations not only grew very poorly but died within 4 to 5 weeks. Chemical analysis showed that exposure to ethylene oxide destroyed a large fraction of the thiamine in the ration. Additional work indicates that a fair amount of riboflavin, niacin, pyridoxine, and folacin may also be destroyed, H. Bakerman et al. (1956). According to H. G. Windmueller and R. W. Engel (1956), histidine and methionine also may be destroyed under similar circumstances.

Trichloroethylene has been used occasionally as a solvent for the extraction of oil from soybeans because it is not a fire hazard. Trichloroethylene-extracted soybean meal, however, is toxic to some animals according to S. Stockman (1916) who noticed that cattle showed signs of toxicity when fed trichloroethylene-extracted soybean oil meal. That the toxicity of the trichloroetheylene-extracted soybean oil meal is not due to the solvent itself was shown by Stockman and by W. R. Pritchard et al. according to T. A. Seto and M. O. Schultze, who fed relatively large amounts of the compound to calves without any harmful effects. If cattle, calves, and horses receive sufficient amounts of

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 ABSTRACTER: Martin Heerdt

7.8 ACID CURING METHODS AND EQUIPMENT - QUALITY CONTROL

Ratz, W.
Fischwaren- und Feinkostindustrie 28, 105 (June 1956) (Bremerhaven-F. W. Germany)
World Fisheries Abstracts 8, 31-32 (March-April 1957)

It is impossible to predict exactly the exchange of acetic acid and salt between the fish and the marinating batch because this depends on so many factors, such as the proportion of fish to the solution. Thus, as long as no equilibrium between the two is reached, no conclusions on the quality and the storage life of marinades can be drawn from the acid and salt determinations of the marinating bath alone, the determinations on the fish must, in such cases, be taken into account. Usually, after 5 days in the bath, constant values are reached; repeated determinations after 6 weeks gave an increase in acetic acid of only 0.2%. The usual method of determining the acetic acid content of the herring gives totally incorrect values, as part of the NaOH is neutralized by the herring meat, partly by the proteins which are progressively hydrolyzed under these circumstances, and partly by saponification of the herring oil. Thus, the longer the NaOH acts upon the herring meat, the higher the values found for acetic acid. Two methods are compared in the table (see over). Method 1. 0.5 to 1 g. of herring meat is minced in a blender and suspended in 30 ml. distilled water, 10 ml. N/10 NaOH are added and the mixture is frequently shaken. After various times (see table over) titration with N/10 HCl and the equivalent calculated as acetic acid. Method 2. As 1, but meat is suspended in 40 ml. distilled water, frequently shaken, and after the same interval titrated with N/10 NaOH, the equivalent calculated as acetic acid.

Method 1 gives incorrect increasing values and Method 2 satisfactory stable values. The correct method for the determination of acetic acid in herring meat is: 0.5 to 1 g. of very finely mixed herring meat carefully weighed, suspended in approx. 40 ml. distilled water and thoroughly shaken

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 ABSTRACTER: C. J. H. van den Broek

UNIDENTIFIED FACTORS FOR CHICKS

BIOLOGICAL VALUE OF PROTEINS

FOOD PROCESSING TOXICITIES

ANALYSES OF MARINADES

6.195

Sheffner et al. then devised an expression of the nutritive values of a number of proteins (whole egg, egg albumin, lactalbumin, soy flour, casein, brewers' yeast and white flour) in terms of the "egg ratio" procedure of Oser as revised by Mitchell. The calculations involved were essentially as follows: (1) a concentration of the essential amino acids in pepsin-digests and in the completely hydrolyzed proteins was determined and (2) each amino acid was then calculated as the percentage of the sum of all of the essential amino acids (plus cystine and tyrosine) in the pepsin-digest and the residue fraction. This residue fraction represents the concentration of amino acids in the completely hydrolyzed protein minus the concentration in the pepsin-digest.

Egg ratios were obtained from the ratio of the percentage of each amino acid in the pepsin-digest of a test protein to the percentage of that amino acid in the pepsin-digest of whole egg. The geometric mean of the egg ratios was then computed logarithmically by averaging the logarithms of the egg ratios and obtaining the antilogarithm. Similar egg ratios were also calculated for the residue fraction. In computing the egg ratios, percentage concentrations of amino acids in excess of those present in the reference protein (egg) were disregarded.

Geometric means of the fractions (pepsin-digest and residue) were each multiplied by a factor to correct for the degree of proteolysis of the test protein relative to that of the reference protein. For example, the sum of the 11 amino acids in pepsin-digest of casein was 73.3 mg. and the sum for egg was 163.5. The former divided by the latter provided the factor needed to correct the geometric means of the egg ratios for pepsin-digest. To obtain an amino acid index for the whole test protein, the corrected geometric means of the pepsin-digest fraction and the residue fraction were weighed in accordance with the percentage of the total reference protein that each represented. The amino acid index thus obtained combines the pattern of essential amino acids obtained from the analysis of the pepsin-digest with the amino acid pattern of the remainder of the protein and is referred to as the Pepsin Digest-Residue (PDR) amino acid index.

6.193

Calcification in chicks. -- In the course of the chick studies with the unidentified inorganic nutrient, many chicks on the basal diet showed abnormal enlargements of the hock. Poults that received the basal purified diet had an even more severe weakness and bowing of the legs. Bone ash assays of the fat-free tibia of poults on the basal diet showed that these poults were suffering from a severe rachitic condition. Experiments showed that poor calcification could be avoided by supplementing the diet with unidentified factor supplements, soybean oil meal, the ash of the unidentified factor supplements, or the ash of soybean oil meal. The effect of the ash of the unidentified factor supplements and the soybean oil meal when investigated further, proved to be concerned in some way with an improvement in phosphorus utilization.

Practical rations for turkeys. -- Early studies with a mixed cereal-soybean oil meal basal diet showed that the addition of vitamin B_{12}, meat scrap, or fish meal produced little or no improvement in the growth of either normal poults or vitamin B_{12} depleted poults. If, however, the diet also contained sources of other unidentified growth factors such as distillers dried solubles, dried whey, brewers' dried yeast, or fresh grass juice, an improvement in growth was obtained. In one experiment it also appeared that fish meal and meat scrap supplemented each other and produced an increase in growth in excess of that obtained with either fish meal or meat scrap alone. Additional studies showed that a diet containing 5 percent fish meal produced a comparable increase in growth if it was supplemented with 0.5 percent glycine. Almquist (1956) showed that glycine supplements fish meal in a manner similar to meat scrap. He also reported that the glycine content of soybean oil meal is much lower than previously reported, whereas the glycine content of meat scrap is very high.

In other studies, fish meal was included as a part of the basal diet as a source of the fish solubles factor. This basal diet was then used in feeding experiments planned to show the growth-promoting activity of distillers dried solubles, milk-byproducts, brewers' dried yeast, grass juice, and an antibiotic. The results show (1) that the primary deficiency in a turkey ration-containing fish meal is the grass juice factor; (2) that distillers dried solubles, dried milk byproducts, and brewers' dried yeast are sources of this factor for turkeys; and (3) that the antibiotic aureomycin is capable of sparing the requirement of the young poult for the unidentified factor.

7.8

After 30 min. phenolphthalein is added and the mixture is titrated with N/10 NaOH until a clear red is obtained. After waiting another 30 sec. the color disappears. A further titration until the clear red reappears gives the final value for acetic acid as follows:

$$\frac{\text{used ml. N/10 NaOH} \times 0.006 \times 100}{\text{g. herring meat weighed}} = \% \text{ acetic acid}$$

The determination of salt should be done as follows: 0.5 to 1 g. of finely minced herring meat is carefully weighed in a porcelain dish and dried in an oven. It is then ashed and the ash transported to a filter. The soluble parts of the ashes are then washed with distilled water in a small flask, in which they are directly titrated with N/10 $AgNO_3$ using K_2CrO_4 as an indicator. Calculation:

$$\frac{\text{used ml. N/10 } AgNO_3 \times 0.0058 \times 100}{\text{g. herring meat weighed}} = \% \text{ salt}$$

ACETIC ACID (%) FOUND IN FISH MEAT

Interval before Titration (min.)	Marinated Fried Herring		Bismarck Herring		Bismarck Herring in Mayonnaise	
	Method 1	Method 2	Method 1	Method 2	Method 1	Method 2
10	1.95	1.61	3.30	2.75	3.10	1.83
15	1.94	1.62	3.32	2.69	3.18	1.82
20	1.99	1.60	3.43	2.72	3.25	1.79
30	1.98	1.59	3.45	2.76	3.24	1.80
45	1.96	1.64	3.69	2.71	3.34	1.85
60	2.08	1.58	4.03	2.73	3.31	1.81
90	2.19	1.62	4.38	2.75	3.47	1.82

6.199 (Cross Reference: 2.9)

trichloroethylene-extracted soybean oil meal they develop aplastic anemia and a fatal hemorrhagic syndrome. Guinea pigs, dogs, and chickens are also affected by it if they receive high levels for long periods of time, but they do not develop blood dyscrasia according to D. F. Eveleth and A. I. Goldsby (1953). The production of trichloroethylene-extracted soybean oil meal has been discontinued for these reasons.

Included in the group of solvent compounds that alter foods are many of the primary, secondary, and tertiary amines, which at present are not being used in the treatment of food. A study of the action of these compounds upon food products resulted from an attempt to extract material from soybean meal that inhibited the action of a number of anti-malarial compounds, D. J. Taylor and J. Greenberg (1955). When this soybean meal was fed to chicks at the level of 50 percent of their ration, growth was inhibited and death resulted within ten days. By feeding one-half of one percent, workers showed that the amine itself was not the toxic agent., Cottonseed meal and, to a lesser extent, blackeyed peas extracted with these amines also are toxic to chicks. These meals also inhibit the growth of rats, guinea pigs, and chicks, but the cause of the meal toxicity is not known.

One of the more recent problems in food safety is the destruction of vitamin A, thiamine, riboflavin, pyridoxine, vitamin B_{12}, ascorbic acid, niacin and proteins as a result of the irradiation of foods.

Nitrogen trichloride, which is no longer used in producing agenized or bleached flour, is another compound known to leave a nutritional imprint on foods. Dogs on a ration composed largely of agenized flour develop neurologic disturbances, which can be overcome by feeding extra amounts of methionine. Chlorine dioxide is now being used in place of nitrogen trichloride for bleaching flour.

6.34 REPORT ON DETECTION OF ALGINATES IN CHOCOLATE PRODUCTS

Perlmutter, Sam H. (Food and Drug Administration, Minneapolis 1, Minnesota)
Journal of the Association of Official Agricultural Chemists 40, 478-482 (May 15, 1957)

A study was made to find a method to detect alginates in chocolate products.

Preliminary. --Varying amounts of alginate powder were added to samples of a chocolate sirup base. The methods of Schroeder and Racicot (1941) and of Bundesen and Martinek (1953) were tried for the detection of alginates in this sirup. As little as 0.5 grams of pancreatin was efficient and practical for digesting and eliminating the starch in 20 grams of the sirup and the casein in milk products. Large amounts of Nuchar removed the interfering chocolate color if the sample was subjected to a long period of shaking, but the quantity must be minimized to avoid loss of alginates by adsorption. Filter aids neither increased the speed of filtration nor resulted in clearer filtrates. To detect alginates in salad dressings and catsup, filter-cel, attapulgas clay, or other decolorizing agents may be useful.

Reagents. --To obtain ferric hydroxide-sulfuric acid reagent, dissolve 10 grams of $FeCl_3 \cdot 6H_2O$ in about 100 milliliters (ml.) of water in a centrifuge bottle and precipitate $Fe(OH)_3$ by the addition of an excess of NH_4OH. Wash the precipitate about 5 times successively with water and centrifuge, decant, and break up the precipitate each time. Dry the precipitate on a steam bath, break it up, and dry it again. Mix the precipitate until a moderately fine powder is obtained, place this powder in a glass-stoppered 250-ml. bottle, add 200 ml. of H_2SO_4, shake vigorously, and allow the precipitate to settle for 7 days. This reagent keeps indefinitely.

Alginate test. --Weigh out a sample containing 10 to 20 milligrams (mg.) of alginate into a 250-ml.

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 ABSTRACTER: Martin Heerdt

8.51 PECULIAR DIGESTIVE SYSTEM OF SHELLFISH

Hashimoto, Yoshiro (Univ. Tokyo)
Kagaku (Tokyo) 26,561-6 (1956)
Chemical Abstracts 51, 6020 (April 25, 1957)

Forms, chem. compn., and functions are described on cryst. style (I), gastric teeth (II), and gastric shield of shell fishes. The I of Mactra sulcataria is sparingly sol. in H_2O, but relatively sol. in alk. soln. It gives pos. color reaction for protein; it is pptd. by phosphotungstic or tannic acid, but not by other protein-pptg. agents. Fresh I contains H_2O 80, inorg. matter 1, and org. matter 11%; about 40% of the org. matter consists of carbohydrate. L-Fucose, D-xylose, D-mannose, D-galactose, D-glucosamine, D-galactosamine, and 2 kinds of unknown acidic sugars are present in the hydrolyzate of I; the compn. of I is similar to that of frog spawn mucin. The II of Dolabella scapula is insol. in H_2O, consists of H_2O 80, inorg. matter of 1.5 and chitin 7.5%, most of other org. matter being protein. Properties of amylase in I are compared with those of human salivary amylase. The ratio of saccharogenic to dextrinogenic activities on sol. starch is 2 to 3 times as high for I amylase as for other animal amylases. No maltase is present in I. Saccharogenic activity is reduced to 20%, and dextrinogenic activity to 50% on heating the enzyme at 60° for 4 min. The presence of 2 types of enzyme is supposed, and a fraction of high saccharogenic activity is obtained after removing α-type amylase by a treatment of the enzyme soln. with raw starch. The fraction forms a large amt. of reducing products from starch, but gives a reddish purple coloration of starch with iodine. The amylase of this type is found for the first time in the animal kingdom.

 Reprinted in whole

8.0 NUTRITIVE VALUE OF FISH. I. NICOTINIC ACID, RIBOFLAVIN, VITAMIN B_{12}, AND AMINO ACIDS OF VARIOUS SALT-WATER SPECIES

Teeri, A. E.; Loughlin, M. E.; and Josselyn, D. (University of New Hampshire, Durham)
Food Research 22, 145-150 (March-April 1957)

Experimental. --The edible portion of market samples of a variety of marine fish and shellfish consumed in New England were homogenized in a Waring Blendor and assayed qualitatively for amino acids and quantitatively for vitamins and proximate composition. Moisture was determined by drying weighed samples in an oven at about 103° C. for 48 hours, whereas protein was determined by the macro-Kjeldahl nitrogen method by using 2-gram aliquots of the homogenized sample. Tabular results appear on this card (see over).

Vitamin assays. --Autoclaved hot-water extracts of the homogenized sample mixtures were used for vitamin assays that were made according to the standard quantitative microbiological methods reported in the Difco manual. Lactobacillus arabinosus number 17-5 (A. T. C. C. number 8014), Lactobacillus casei number 7469, and Lactobacillus leichmannii number 7830 were used, respectively, for assays of nicotinic acid, riboflavin, and vitamin B_{12}.

Chromatographic assays. --The relative distribution of the amino acids was determined on 5-gram aliquots of the homogenized samples. These samples were hydrolized for 24 hours at 100° C. in about 6 normal hydrochloric acid, filtered, and deacidified in batches with amberlite IR-4B (OH) resin. The deacidified solution was decanted from the resin, washed to make a total volume of 500 milliliters (ml.). Then 200 of the 500 ml. was evaporated down to 10 ml. and subjected to two directional ascending chromatography by the method of Williams and Kirby (1948), with phenol-water and collidine-lutidine water as the resolving solutions followed by a ninhydrin spray. Tryptophane was detected after alkaline hydrolysis of a 5-gram aliquot of the homogenized sample. Other chromatographic procedures were used for specific tests for histidine, tyrosine, and tryptophan and for comparisons and quantitative estimations of standard amounts of known amino acids.

See table, over.

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 ABSTRACTER: Martin Heerdt

8.59 NUCLEOTIDES IN THE SKELETAL MUSCLE OF CODLING (GADUS CALLARIAS)

Jones, N. R. and Murray, J. (Torry Research Station, Aberdeen, Scotland)
The Biochemical Journal 66, 5P(May 1957)

Experimental. --Codling were killed by immersion in liquid air. Then a formic acid gradient-elution system was used to chromatograph the nucleotides from the muscle of these codling on Dowex-1 according to the method of Hurlbert, Schmitz, Brumm, and Potter (1954). In addition, the major adenine and hypoxanthine nucleotides from the muscle of rested and exhausted codlings were recovered and measured. And finally, GTP, UTP, CTP, and ADX were identified among a number of minor components.

Results. --Average ATP, ADP, AMP, DPN, and IMP values from six samples of rested and exhausted codling were respectively: 5.34 and 0.260, 0.576 and 0.426, 0.069 and 0.057, 0.107 and 0.338, and 1.26 and 5.86 micromoles per gram. The last value represents a dephosphorylation-deamination of over 80 percent of the ATP.

Similar techniques were used to follow changes in the nucleotide composition of exhausted, trawl-caught codling eviscerated and stored in ice at 2° C. Storage of eviscerated codling in ice at 2° C. are most likely to minimize the denaturation of actomyosin, to avoid damage to the excised muscle, and to delay the invasion of bacteria during the first six days of storage. After 24 hours of storage in ice at 2° C. the codling had barely passed through rigor. Average ATP, ADP, AMP, DPN, and IMP values from six samples were after 24, 48, and 144 hours respectively: 0.120, 0.095, and 0.10, 0.196, 0.202, and 0.14; 0.055, 0.125, and 0.14; 0.048, 0.055, and --; and 4.34, 4.30, and 0.660. At these levels the adenine nucleotides appear to resist (1) further non-bacterial enzymatic breakdown and (2) leaching, which may rapidly remove other metabolities.

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 ABSTRACTER: Martin Heerdt

ASSAY FOR ALGIN IN FOODS

NUTRITIVE VALUE OF FISH

ENZYMES IN SHELLFISH

COD MUSCLE NUCLEOTIDES

8.0 (Cross Reference: 2.9, 8.51, 8.64)

Average protein and B vitamin content of various species (fresh weight basis)[1]

Species	Moisture	Protein[2]	Nicotinic Acid	Riboflavin	Vitamin B_{12}
	%	%	mcg./g.	mcg./g.	milli-mcg./g.
Cod	81.8	16.8	19.8	0.31	4.5
Cusk	80.7	17.4	22.0	0.32	3.0
Haddock	81.2	17.7	30.2	0.53	5.3
Haddock Roe	70.5	24.6	13.5	6.90	51.0
Halibut	79.7	18.6	62.1	0.51	7.1
Mackerel	71.4	20.1	76.2	2.51	48.5
Salmon	75.0	20.0	71.9	0.99	28.9
Smelts	80.2	15.6	14.5	1.20	34.4
Swordfish	76.7	19.3	73.9	0.50	5.7
Molluscs:					
Clams	87.9	8.5	12.6	1.88	623.0
Oysters	87.5	6.8	13.1	1.66	146.0
Scallops	79.7	16.4	11.5	0.65	13.4
Crustaceans:					
Lobster (claw)	78.5	17.3	12.4	0.46	4.6
Lobster (tail)	76.4	20.3	16.7	0.50	4.9
Shrimp	78.4	19.9	31.2	0.27	9.1
Canned fish:					
Crab	80.1	16.3	13.7	0.84	4.6
Salmon	66.2	22.4	56.3	1.98	20.7
Tuna	69.6	28.3	141.0	1.05	14.8

[1]Each figure represents 4 to 11 samples. [2]Protein = N x 6.25.

8.59 (Cross Reference: 1.51)

The total amount of ribose extractable with trichoroacetic acid was estimated by the method of Meijbaum (1939) and found to have declined from 9.4 to 8.9 micromoles per gram over the 6-day period. the authors suggest a supposition that the residual nucleotides fraction may correspond with the bound nucleotide of myofibril. An estimate of the proportions of total ribose to ribose not precipitated in 76 percent ethanol by barium acetate at pH 8.2 were in good agreement with the nucleotide analysis.

6.34

centrifuge bottle, add water to make a total volume of 40 to 50 ml., and dissolve by swirling. Adjust the contents to a pH of 8 to 9 with saturated Na_3PO_4 solution (about 5 drops). Add to the contents about 0.5 grams of pancreatin, 3 drops of formaldehyde, shake vigorously for 1 minute, and allow to stand for 2 to 16 hours. Centrifuge the contents at 1200 revolutions per minute for 2 to 3 minutes, decant into a 250-ml. centrifuge bottle, and discard the residue. Add 3 to 4 volumes of alcohol, shake, and allow to stand for at least 1 hour with occasional shaking. Centrifuge as before and discard the liquid. Add 50 ml. of water and 5 drops of 0.1N NaOH to the residue. Now shake vigorously until it appears that no more residue will dissolve, then add 3 grams of decolorizing C (Nuchar), and shake vigorously for 1 hour on a shaking machine. Pour the contents directly into a folded filter paper, and collect the filtrate in a 250-ml. centrifuge bottle. Refilter through the same paper if the filtrate is not clear. The C will retain some alginate; therefore, to recover very small amounts of alginate (about 1 mg.), re-extract the C by shaking it with another 50 ml. portion of water and 5 drops of 0.1N NaOH. Add this filtrate to the filtrate from the first extraction.

To the combined filtrates add four volumes of alcohol, shake, allow to stand for 1 hour as before, centrifuge, and decant. Dry the residue, which contains alginates, gums, and gelatin, on a steam bath until the alcohol odor is gone. Cool the residue, add 3 to 4 drops of 0.1N NaOH, and dissolve the residue. Now add 2 ml. of the Fe-H_2SO_4 reagent and mix residue and reagent with a glass rod. The development of a brown color indicates the need for an additional 2 ml. of reagent. If a purple color develops rapidly, enough reagent has been added. Allow the color reaction to stand overnight. A deep purple color is a positive test for alginates. If a negative test is obtained, repeat the assay with double the original sample.

Conclusions.--Four steps are involved in a procedure outlined for the detection of as little as 0.1 percent algin in chocolate products and other foods. These are (1) treating the product with pancreatin to digest starch and casein, (2) mixing the treated product thoroughly with decolorizing carbon, (3) isolating the alginate in alcohol, and (4) testing colorimetrically for alginate with ferric hydroxide-sulfuric acid reagent.

8.51

3.63 FREEZE-DRIED FOODS: WHAT THEY ARE--HOW THEY ARE PREPARED

Flosdorf, Earl W. (F. J. Stokes Machine Co., Philadelphia)
Frosted Food Field 24, 15 (June 1957)

Dehydrated foods have long been recognized as having great stability without refrigeration. This provides low cost of distribution and convenience of storage on the pantry shelf. But never, until now, have dehydrated foods been satisfactory to the palate.

Manufacture of the freeze-dried product begins the same as with any product distributed by the Frozen Food Industry. In the case of meat, proper cut must be selected, trimmed free of fat and deboned for individual servings of proper thickness, and then frozen.

The frozen product is placed in a vacuum dryer carrying means for heating. As a variant some foods are better when vacuum frozen in the dryer. Here, under the influence of high vacuum, the water content in the frozen food is rapidly removed by evaporation without melting. Technically this is known as vacuum sublimation. Even though frozen, heat must be supplied as a source of the latent heat of sublimation. Solid ice passes directly to the vapor state without passing through the liquid water state.

As a result of the low temperature, chemical alteration or changes in the frozen food do not take place and bacterial contamination cannot proceed. Volatile components contributing to good flavor and taste do not disappear and colloidal changes do not take place to alter the physical form.

There is no "case-hardening" of the surface of the material so that very low moisture content for high stability is readily obtained without affecting solubility. Less than 1 percent residual moisture can be reached. With meat this means removing about 99.75 percent of original moisture. Even at

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 ABSTRACTER: Kathryn L. Osterhaug

4.89 UTILIZATION OF FISH OILS IN ORE FLOTATION

Cooke, S. R. B. (School of Mines and Metallurgy, University of Minnesota, Minneapolis) and Stansby, M. E. (U. S. Fish and Wildlife Service, Seattle 2, Washington)
Commercial Fisheries Review (Technology Supplement) 19, No. 4a, 24-29 (April 1957)

At one time fish oils were used to a small extent in ore flotation. Research by competing oil producers resulted in the development of oil derivatives, such as alkyl amines, that are equal or superior to the aliphatic alcohols. Oleic acid is, however, still widely employed as a flotation collector.

The flotation process can be employed in the concentration of low-grade iron ores. At present, the high-grade iron ores are nearing exhaustion so that in the future the abundant lower-grade ores will be the principal source of iron production in this country.

If fish oils can be utilized advantageously for low-grade iron ore flotation, the potential useage at one-half pound per ton of ore is about 5-million gallons a year. In addition to this large potential use of oils in the concentration of iron ore, there are sizeable quantities of other ores that are presently being concentrated by flotation methods. These include manganese and nonmetallic ores such as fluorite and phosphate.

Research on the effect of the chain length and degree of unsaturation of various compounds on their efficiency as ore-flotation agents has been carried out at the School of Mines and Metallurgy of the University of Minnesota. The present study includes an extension of this work to consider the longer-chain compounds of higher degree of unsaturation contained in fish oils to determine if they offer any advantages over the flotation agents being currently employed. Some of the preliminary work on shorter-chain fatty acids already carried out at Minnesota has indicated that there are advantages

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 ABSTRACTER: Kathryn L. Osterhaug

4.11 CHROMATOGRAPHIC ANALYSIS OF SOME CONSTITUENTS OF MARINE-ANIMAL OILS

Reiser, Raymond; Sorrels, Mary Francis (Texas Agricultural and Mechanical College); and Bender, Maurice (U. S. Fish and Wildlife Service, College Park, Maryland)
Commercial Fisheries Review (Technology Supplement) 19, No. 4a, 9-10 (April 1957)

This article is a summary of a study conducted under contract with the U. S. Fish and Wildlife Service and supported by funds provided by the Saltonstall-Kennedy Act of 1954.

Because existing methods for the analysis of naturally occurring lipid mixtures are time-consuming and uncertain, a study was undertaken to determine the feasibility of separating and identifying lipid constituents of marine oils by means of the silicic acid-impregnated glass-fiber filter paper technique of Diecker and Reiser. This method allows for the separation of microgram quantities of lipids.

Experimental.--The marine oils were first separated on a column into five groups with five solvent systems according to the method of Fillerup and Mead. The eluates were concentrated and then chromatographed on the silicic acid paper.

Results and discussion.--The first fraction contained vitamin A palmitate, cholesteryl palmitate, squalene, hexadecyl palmitate, and the tocopherols. All the triglycerides came through in the second fraction with a part of the aliphatic alcohol. The remainder of the latter appeared in fraction three along with vitamin A alcohol, cholesterol, and vitamin D_3. The 7-dehydrocholesterol should also have appeared in fraction three according to preliminary tests. The fourth fraction contained the fatty acids and the fifth, the phospholipids. In the oil samples studied, phosphatidylethanolamine was the only phospholipid demonstrable. Ninhydrin tests for phosphatidylethanolamine were much less sensitive than the chromatograms.

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 ABSTRACTER: Kathryn L. Osterhaug

4.89 DETERGENTS IN RELATION TO MODERN LIVING

Crecelius, Samuel B. (Economics Laboratory, Inc., St. Paul, Minnesota)
The Minnesota Chemist 9, 9 (May-June 1957)

Detergent materials may be roughly divided into those used in the home and those used in industry.

The home uses are as follows: the laundry (general use includes all built soaps and synthetic detergent powders), dishwashing, surface cleaners, (agents used to clean hard surfaces found in the home), shampoos, bath soaps, and special, non-aqueous cleaners for rug and wallpaper work.

The main industrial applications are: laundry work (specially formulated, heavy duty soaps, and hydrocarbon or chlorinated hydrocarbon solvents), commercial machine dishwashing (mostly inorganic compounds), degreasing agents (the metal finishing and metal plating industries), lubrication (special detergents are added to lubricating oils to prevent oxidation of moving parts), electroplating, and janitorial supplies.

Organic detergents may be divided into three types: (a) anionic, (b) cationic, and (c) non-ionic. The alkyl aryl sulfonates and the sulfonated long chain alcohols are important examples of anionic detergents. The most important cationic detergents are the quaternary ammonium salts which find application as sanitizers and textile softeners. Non-ionic detergents are characterized by such groups as alcoholic hydroxyls, ethers, esters, and amides. They are often condensed polymers derived from the condensation of ethylene oxide with fatty acids, alcohols, and phenols. These products are valuable when low foaming is desired.

Figure 3 illustrates the total production of solid soaps and synthetic detergents, solid soaps, alone, solid synthetic detergents alone, and liquid synthetics alone.

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 ABSTRACTER: Donald C. Malins

FREEZE-DRIED FOODS

MARINE OIL CHROMATOGRAPHY

FISH OILS FOR ORE FLOTATION

SOAPS AND DETERGENTS

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Vitamin A alcohol and vitamin D_3 apparently underwent some change during the separation process that rendered them difficult to demonstrate. "Super D" cod-liver oil showed spots corresponding to triglycerides, vitamin D_3, vitamin A alcohol, phosphalidylethanolamine, and an unidentified component. Silmo cod-liver oil and menhaden oil chromatograms indicated the presence of squalene in addition to those compounds identified in "Super D."

Summary and conclusions. -- A scheme for the separation and identification of some constituents of marine animal oils was developed. A preliminary separation on a silicic acid column with five solvent systems was followed by further separation and identification on silicic acid impregnated glass-fiber filter paper. This method can be used successfully for qualitative determinations, but the irregularities in the glass paper prevent an accurate quantitative assay.

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Total solid soap production is showing a steady increase; soap in solids is showing a rapid decrease, almost 100 percent, in six years; synthetics in solids and liquid synthetics are showing a very rapid increase and are, apparently, replacing the use of soaps.

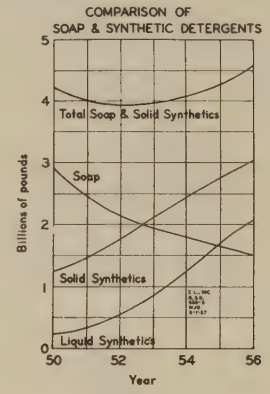

Figure 3.

3.63

this low final moisture, the product, because of its sponge-like structure, reconstitutes instantly to its original form upon the addition of water. Actually, a final moisture content two or three times higher is adequate for normal length and conditions of storage.

Bacterial growth not only cannot occur during processing but also it cannot occur in the dried product during storage. However, after restoration with water it must be treated like any fresh food.

Almost all food products lend themselves to successful freeze-drying. However, because of the low intrinsic value of certain foods, many cannot carry the burden of higher processing cost.

Foods like crab, oyster, and clam, and even lobster, mixed with other ingredients have many advantages for this new type of preparation. The cost of raw material may be reduced by use of lower-priced added ingredients. The factory prepared product is made initially by professional technicians utilizing fine chef-developed recipes.

The final product from cooked ingredients is readily prepared by the simple addition of hot water. Raw products are readily reconstituted with cold water and cooked according to directions or the cook's preference.

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both to long-chain length and to high degree of unsaturation. In past work, alkyl amines in some cases have proved superior to the fatty acids as flotation agents. In the initial experimental work, tests have been confined to use of fish-oil fatty acids. Some tests of derivatives of fish oil, such as alcohols, will be made to see if they will function as compatible frothers with the fish-oil fatty acids.

A standard procedure has been developed for testing the efficiency of different flotation agents using Michigan specularite or jasper ore. The ore first is crushed fine enough to pass through a 20-mesh screen and the very fine material of less than 10-micron size is removed (de-slimed) by use of a hydraulic elutriator. Flotation then is carried out using each fatty acid under test at a series of pH values and employing different ratios of fatty acids to ore. The iron content of the concentrates and of the tailings then is determined.

Concentration experiments have been completed at a series of pH values between 5 and 9, comparing the selective index when using oleic acid and the mixed fatty acids from pilchard oil. On the ores so far investigated, the optimum pH seems to lie between 6 and 7. Selectivity is extremely poor at pH 8 or higher, and frothing is unsatisfactory below 5. When an addition of fatty acid of one pound per ton of ore was employed (the optimum value for oleic acid), the pilchard fatty acids showed a lower selectivity index than did the oleic acid. When, however, the pilchard-oil fatty acid concentration was lowered to 0.5 pound per ton of ore, the selectivity index was equal to that of oleic acid, at the lower pH values, and was markedly higher, at a pH value of 8.

A systematic investigation of the effect of fish-oil fatty acids, fractionated according to degree of unsaturation and approximate chain length upon their effectiveness as iron-ore flotation collectors is under way.

This work is being conducted under contract with the U. S. Fish and Wildlife Service with funds provided by the Saltonstall-Kennedy Act.

0.33 NON-ENZYMIC BROWNING: THE REACTION BETWEEN D-GLUCOSE AND GLYCINE IN THE "DRY" STATE

Richards, E. L. (The Dairy Research Institute (N.S.) Palmerston North, New Zealand)
The Biochemical Journal 64, 639-644 (December 1956)

The dry reaction between D-glucose and glycine (37° C., pH 6.7 and 70 percent relative humidity) produced an intermediate compound which gave color reactions of both a sugar and an amino acid. This compound was isolated chromatographically pure from the reaction mixture by displacement chromatography on an ion-exchange resin and was found to be a very strong reducing agent but not a ketose. In acid it gave 5-hydroxymethylfurfuraldehyde and glycine. The compound has been identified since the infrared spectrum of its sodium salt is consistent with that expected for the sodium salt of the enolic form of N-(carboxymethyl) amino-1-deoxyfructose.

0.33 APPLICATION OF ETHYLENEDIAMINETETRA-ACETIC ACID IN THE ISOLATION OF CRUSTACEAN CHITIN

Foster, A. B. and Hachman, R. H. (University, Edgbaston, Birmingham 15, England)
Nature 180, 40-41 (July 6, 1957)

In seeking milder methods for the isolation of chitin, the authors have studied the action of ethylene-diamenetetra-acetic acid on the cuticle of the edible crab, Cancer pagurus.

2.3 METHOD OF FILLETING COD AND YIELD OF THE PRODUCTION IN AN ANNUAL CYCLE

Cieglewicz, W. and Kordyl, E.
Prace Morsk. Inst. Ryback, Gdyni No. 7, 191-208 (1954)
Food Science Abstracts 28, 572 (December 1956)

A method was elaborated for filleting cod, and the yield from the raw material was assessed in relation to sex and to gonadal development in the annual cycle. The male fish gave better and less variable yields than the female. With both sexes, the average annual yield after evisceration and heading was 53.8%, for fillets with skin 38.9%, and for skinless fillets 35.8%, of the total weight of fish. The best period for filleting was between November and March, the poorest between May and August.

2.3 NEW NOBBING UNIT HANDLES 180 TO 300 FISH PER MINUTE

Anonymous
Food Engineering 29, 191 (January 1957)

Most small or medium-sized herring- and mackerel-type fish may be gutted and decapitated automatically in this new nobbing machine. An optional attachment removes tails and/or cuts fish into chunks. Unit's conveyor is available in four-fish-pocket widths, and has feeding space for two attendants. However, the two larger conveyor sizes may be lengthened about 3 ft. to accommodate up to four feeders. Output varies from 180 to 300 per min. Standard dimensions: 8 ft.-length, heights 2 ft. 2 in. and 3 ft. 8 in. Of stainless construction, machine has enclosed gear box and water-jet flush cleaning.

2.9 A NOTE ON THE POISON OF A BARRACUDA, SPHYRAENA PICUDA

Hashimoto, Yoshiro
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 11, 1153-1157 (1956) (In English)

2.9 (Cross Reference: 3.19)

RADIOACTIVITY CONTAMINATION IN FOODSTUFFS EFFECTED BY ATOMIC- AND HYDROGEN-BOMB EXPLOSIONS

Nagasawa, Kakuma; Kawashiro, Iwao; Nakayama, Goichi; Kashima, Tetsu; Enomoto, Masayoshi; Serizawi, Jun; Ohkuma, Seiichi; Kawamura, Shoichi; and Nishizaki, Sasao
Eisei Shikeno Hokoku No. 74, 213-29 (1956)
Chemical Abstracts 51, 8321 (June 10, 1957)

V. The radioactive contamination in marine fishes and its radiochemical analysis Neothunnus macropterus caught on June 28-July 8, 1954, at N 4°, E 140-3°, Pacific Ocean greatly contaminated with radioactivity in its organs as follows: spleen, liver, kidney > stomach, blood, ovary, intestine > heart, testis. Muscle and kidney show 4500 and 811,000 counts/min./g. ash, with Zn^{65} radioactivity being 76 and 33%, resp. Sr^{90} is found in muscle, amounting to 0.2% of total. Half-lives of organs are as follows: spleen, kidney, ovary >100 days; liver, intestine, stomach, heart, testis, 50 to 70 days.

3.13 STUDIES ON THE PRESERVATION OF FISH-CAKES--IV. FACTORS INVOLVED IN PRESERVATIVE EFFECT OF CARBON DIOXIDE

Yokoseki, Motonobu; Uchiyama, Hitoshi; and Amano, Keishi
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 1, 35-40 (1956) (English abstract, table, and figures)

The preservative effect of carbon dioxide for fish-cake may be dependent not only on the oxygen free state which can be attained by replacing the air with gas, but also on the suppression of bacterial respiration under an excessive concentration of carbon dioxide.

3.13 OZONE IN THE PROCESSING AND TRANSPORT OF SEA FISH

Mader, K.
Fette, Seifen, Anstrichmitt., 58, 429-431 (1956)
Food Science Abstracts 29, 29 (February 1957)

Apparatus which can be used for ozonization on board fishing vessels is described. Cold, dry air should be used for ozonization procedures. An installation for ozonization in a ship with refrigeration facilities is shown diagrammatically.

3.13 PRESERVATION OF FISH OR OTHER PERISHABLE MATERIAL IN ICE PREPARED FROM WATER SATURATED WITH CARBON DIOXIDE

Lezier, Gerard
Fr. 1, 135, 138 (Apr. 24, 1957)
Chemical Abstracts 51, 9037 (June 25, 1957)

3.19 CURRENT DEVELOPMENTS IN ATOMIC IRRADIATION PRESERVATION OF FOOD

Cavanagh, Joe
The Canner and Freezer 122, 16-17 (May 28, 1956)

3.19 POINTERS ON CONTROLLING DOSAGE IN FOOD IRRADIATION

Danald, George E. and Farkas, Daniel F.
Food Engineering 29, 60-62 (June 1957)

3.19 RADIATION PRESERVATION OF CURED MEATS

Erdman, Anna Marie and Watts, Betty M. (Florida State University, Tallahassee)
Food Technology 11, 349-353 (July 1957)

Commercial cured meats (ham and bologna) were radiated in air with gamma rays from a cobalt 60 source. Dosages ranging from 2×10^5 to 2×10^6 rep caused severe color losses, off-odors, loss of free SH groups and marked changes in nitrite. The application of sodium ascorbate in the presence of excess nitrite gave color and odor protection during radiation and brief storage periods.

3.231 DEHYDRATING SYSTEM FOR THE WALLS OF COLD-STORAGE ROOMS

Munters, C. G.
U. S. Patent 2,785,390 (August 14, 1956)

What is claimed is: the combination, with a refrigerating room having walls containing insulation formed by masses of solid material into which moisture diffuses, of a system for dehydrating the insulation comprising ventilation spaces located in said walls and in diffusion relation with the insulation therein, conduit means located outside said room and communicating at spaced places with said spaces to provide a circuit for circulation of air through said spaces, said conduit means including a fan for effecting said circulation and a drying room containing a solid moisture absorbing agent for removing moisture from air taken from said spaces before the return thereof to said spaces.

3.231 BRINE COOLING OF FISH ABOARD A FISHING VESSEL

Slavin, Joseph W.
Industrial Refrigeration 131, 30, 32, 34 (October 1956)

(Abstract of this article appears under 2.118 page 5 - April 1957)

3.237 "TENTATIVE" METHOD FOR DETERMINING COATING CONTENT OF FROZEN FRIED FISH STICKS

Anonymous
Commercial Fisheries Review 18, 12 (September 1956)

(Abstract of this article appears under 7.80 page 23 - February 1957)

3.237 AUTOMATIC QUICK FREEZING

Holt, Lawrence
Fishing Gazette 74, 34, 55 (January 1957)

(Abstract of this article appears under 3.2341 page 13 - May 1957)

3.237 TECHNICAL NOTE NO. 36 --DETERMINING FISH CONTENT OF FROZEN FRIED FISH STICKS

Frascatore, Anthony J., Jr.
Commercial Fisheries Review 19, 30-33 (January 1957)

(Abstract of this article appears under 7.73 page 15 - August 1957)

3.332 MECHANISM FOR PREPARING FISH FOR CANNING

Walker, Harry E.
U. S. Patent 2,771,632 (November 27, 1956)

This machine is designed to eliminate many of the tedious hand operations necessary in preparing small fish such as sardines, anchovies, and herring for canning. An elevator delivers the bulk fish to an orienting station where the fish are turned with heads in one direction and delivered to the periphery of a rotating wheel. Slots, parallel to the axis of this wheel, receive each fish which is clamped in position by suitable mechanism in each slot. As the wheel rotates the head and entrails are removed and the body cavity is washed out. The body sections are cut into a predetermined length and are delivered to the packing line.

3.332 THE BEHAVIOUR OF FISH FLESH DURING STERILIZATION AND STORAGE OF CANNED PRODUCTS

Witte, H.
Fette, Seifen, Anstrichmitt., 58, 423-425 (1956)
Food Science Abstracts 29, 32 (February 1957)

When large numbers of commercial samples of canned herring fillets in tomato sauce were analyzed with regard to weight of fillets and compostion of the sauce, marked differences were noted. A similar study of experimentally prepared herring fillets in sauces of different composition indicated that the sauce itself, and the degree of filling of the can, had relatively little influence on the change in weight of the fillets during sterilization and storage. The most significant factor was the method used for cooking the fillets (steam, infrared heating, etc.).

LIST OF PUBLICATIONS REGULARLY ABSTRACTED

Analyst
Analytical Chemistry
Archives of Biochemistry and Biophysics
Biochemical Journal
Bulletin of the Faculty of Fisheries, Hokkaido University
Bulletin of the Japanese Society of Scientific Fisheries
California Fish and Game
Canadian Fisherman
Canadian Journal of Chemistry
Canadian Journal of Technology
Canner and Freezer
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Food Engineering
Food Manufacture
Food Packer
Food Preservation Quarterly
Food Processing
Food Research
Food Science Abstracts
Food Technology
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Institutions
Journal of Agricultural and Food Chemistry
Journal of Applied Chemistry
Journal of Biological Chemistry
Journal of Nutrition
Journal of Organic Chemistry
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Chemical Society (London)
Journal of the Fisheries Research Board of Canada
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Modern Packaging
Modern Refrigeration
National Fisherman
National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Pan American Fisherman
Poultry Science
Practical Home Economics
Progressive Fish-Culturist
Quick Frozen Foods
Refrigerating Engineering
Report of the Food Investigation Board (Great Britain)
Science
Southern Fisherman
Trade News (Fisheries Department, Canada)
Western Fisheries
World Fisheries Abstracts
World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

- - -

Editorial Clerk (Typist)--Gladys K. Chandler

6.3 ENZYME SYSTEMS IN MARINE ALGAE. THE CARBOHYDRASE ACTIVITIES OF UNFRACTIONATED EXTRACTS OF CLADOPHORA RUPESTRIS, LAMINARIA DIGITATA, RHODYMENIA PALMATA AND ULVA LACTUCA

Duncan, W. A. M.; Manners, D. J.; and Ross, A. G. (Department of Chemistry, University of Edinburgh)
The Biochemical Journal 63, 44-51 (May 1956)

The extracts show hydrolytic activity towards a number of α- and β-glucosides, lactose, mannan, xylan, starch, glycogen, laminarin, lichenin, glucan, cellodextrin and sodium carboxymethylcellulose. Under certain conditions, enzymic synthesis of higher saccharides from maltose, isomaltose and cellobiose has been observed.

6.3 USING GLYCERIN WITH WATER-SOLUBLE GUMS

Segur, J. B.; Whittaker, E. L.; and Miner, C. S., Jr. (The Miner Laboratories, Chicago, Illinois)
Food Technology 34, 625-626 (December 1956)

Solutions of agar, carrageen, and sodium alginate that were modified by the addition of 5 to 20 percent glycerin showed increased viscosity of their gum solutions and increased stiffness of their gels. Agar and carrageen gels containing glycerin were partially protected from damage by freezing.

7.51 ON THE EXTRACTABILITY OF MUSCLE PROTEINS OF MARINE ANIMALS

Migita, Masao and Matsumoto, Juichiro J.
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 9, 561-568 (1956) (English abstract, tables, and figures)

To provide the basis of the study on marine animal proteins, quantitative efficiency of various extraction methods that have been used by investigators was experimentally compared, using water or Dyer's 5% NaCl solution[4] as the extractant.

The squid or flatfish muscles were extracted at varying ratios of extractant (ml.)/muscle (g.). More than 20 ratios were recommended to get a good extractability, except in the case of the aqueous extraction of the squid muscle.

7.51 ASSAY METHOD FOR THE DETERMINATION OF PROTEIN QUALITY

Pisano, John J. (Rutgers University, New Brunswick, New Jersey)
Univ. Microfilms Publ. No. 16687, 135 pp. (1956)
Chemical Abstracts 50, 16953 (November 25, 1956)

7.51 A SIMPLE METHOD FOR THE ISOLATION AND CRYSTALLIZATION OF TROPOMYOSIN FROM THE MUSCLES OF THE CLAM, VENUS MERCENARIA

Laki, K. (Public Health Service, Bethesda, Maryland)
Archives of Biochemistry and Biophysics 67, 240-242 (March 1957)

7.81 REDUCTION OF TRIMETHYLAMINE OXIDE BY BACTERIA I. THE ENTEROBACTERIACEAE

Wood, A. J. and Baird, Elizabeth A.
Journal of the Fisheries Research Board of Canada 6, 194-201 (August 1943)

(Abstract of this article appears under 2.01 page 7 - June 1957)

7.81 INDEXES OF FRESHNESS IN EDIBLE FISH

Pierangeli, Enrique; Crespo, Juan F. Garcia; and Lopez, Rogelio B.
Rev. Asoc. argentina dietol. 13, 67-82 (1954)
Chemical Abstracts 51, 6033 (April 25, 1957)

A correlation is found between the volatile basic N (I) and the freshness of fish. In detg. I, a 20-g. portion of macerated fillet is dispersed in a total vol. of 300 ml. distd. H_2O, 2 g. of MgO and a piece of paraffin are added, and the I in this mixt. is distd. into 250 ml. of dil. H_2SO_4 contg. bromocresol purple. The excess H_2SO_4 is titrated with dil. NaOH. The organoleptic characteristics and I levels are given for 68 samples representing 18 varieties of fish.

7.89 SOME OBJECTIVE METHODS FOR EVALUATING THE FRESHNESS OF FISH

Bukowska, H.
Przem. Spozyw. 9, 199-200 (1955)
Food Science Abstracts 28, 467 (October 1956)

The method proposed is based on the change in color produced when amino acids react with bromothymol blue. Aqueous extracts of cod flesh, to which bromothymol blue was added, showed a more intense green color when spoilage of the fish was well advanced. The intensity of the color formed was compared with standard solutions of the indicator.

7.89 QUALITY OF SARDINES: EVALUATION OF FIRMNESS BY DIRECT MEASUREMENT OF THE RESISTANCE OF THE ABDOMINAL WALLS

Chaponneaux, P.
Cah. Lab. Froid Cons., Ain-Sehaa, Casablanca, No. 2, 7 pp. (1956)
Food Science Abstracts 28, 566 (December 1956)

The firmness of the flesh of sardines diminishes considerably before spoilage can be demonstrated by increases in contents of volatile bases, reducing substances, indole, or trimethylamine. This alteration is first apparent in the thin abdominal walls. A method is described for determining the firmness of these walls by placing the sardine on a spring balance, and measuring the pressure required to pierce the wall at an anatomically defined spot, with a standard instrument.

INDEX

Subject	Page No.	Card No.
Analysis, organic		
Assay methods for protein quality	23	7.51
Isolation of tropomyosin	23	7.51
Muscle protein extraction	23	7.51
Apparatus and equipment, laboratory and plant		
Food texture press	1	0.118
Canned fish, general		
Cannery sanitation	7	3.30
Canned fish, processing		
Struvite prevention	7	3.3343
High temperature food sterilization	9	3.336
Fish dressing for canning	21	3.332
Behaviour of canned fish	21	3.332
Chemistry and biochemistry, miscellaneous		
Isolation of chitin	19	0.33
D-glucose--glycine dry reaction	19	0.33
Composition, inorganic		
Nutritive value of fish	15	8.0
Composition, organic		
Squalene content of shark	11	4.15
Enzymes in shellfish	15	8.51
Cod muscle nucleotides	15	8.59
Sugars in mollusc style	25	8.59
Crude sulfonmuco-polysacchride	25	8.59
Composition, vitamins		
Vitamin B_6 in fish	25	8.64
B-vitamins in pyloric caeca	25	8.64
B-vitamins in skipjack caeca	25	8.64
Crab		
Dungeness crab fishery	1	1.86
Dried and dehydrated fish		
Freeze-dried foods	9	3.60
Freeze-dried foods	17	3.63
Economics and statistics		
1954 fishery statistics	25	9.2
Fish meal, nutritive value		
Unidentified factors for chicks	13	6.193
Biological value of proteins	13	6.195
Food processing toxicities	13	6.199
Fish meal and oil, manufacture		
Portable reduction plant	11	6.131
Antioxidants for fish meal	11	6.14
Fishery biology and fish culture		
Amino acid test diet for salmon	25	9.14
Protein needs of salmon	25	9.14
Freshness of fish		
Analyses of marinades	13	7.8
Indices of freshness	23	7.81
Sardine firmness measurement	23	7.89
Freshness tests	23	7.89
Frozen fish, processing		
Vertical plate freezer	5	3.231
Frozen whole crabs	7	3.235
Dryer for wall insulation	21	3.231
Gear, fishing		
Trawl construction	1	2.1121
Handling fresh fish		
Jacketed cool room	3	2.40
Fillet yield from cod	19	2.3
Fish eviscerating unit	19	2.3
Marine plant products		
Assay for algin in foods	15	6.34
Water-soluble gums	23	6.3
Carbohydrases in marine algae	23	6.3
Nutritional value of fish and toxicity		
Radioactivity in fish	19	2.9
Poison from barracuda flesh	19	2.9
Oils, chemical and physical properties		
1956 literature review on oils	9	4.0
Marine oil chromatography	17	4.11
Oils, utilization and marketing		
Soaps and detergents	17	4.89
Fish oils for ore flotation	17	4.89
Preserved fish, miscellaneous		
Food irradiation research	5	3.19
Irradiation preservation of food	21	3.19
Preservatives and sanitation		
Types of preserved fish	5	3.
Aureomycin for fresh oysters	5	3.12
Germicidal activities of chlorine compounds	7	3.18
Carbon dioxide as preservative	19	3.13
Ozone preservation	19	3.13
CO_2 saturated ice	19	3.13
Irradiation of ham and bologna	21	3.19
Irradiation dosage control	21	3.19
Smoked fish		
Quality of brisling	9	3.4
Smoking and drying oven	11	3.4
Spoilage		
Path of spoilage	1	2.01
Factors affecting triamineoxidase	3	2.01
Vessels, fishing		
Protection from marine borers	3	2.113
New vessel hull design	3	2.115

8.59 STUDIES ON THE CRYSTALLINE STYLE OF MOLLUSCS V. CHEMICAL CONSTITUENTS OF THE STYLE OF MACTRA SULCATARIA REEVE (PART 3)

Hashimoto, Yoshiro and Sato, Tokuji (Faculty of Agriculture, Tokyo University, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 7, 417-419 (1956) (In English)

The neutral sugars contained in the style of M. sulcataria were separated from the hydrolyzate by using ion-exchange resins and then fractionated on a hydrocellulose column. Desoxyribose, L-fucose, D-xylose, acetylhexosamine, D-mannose and D-galactose were identified, as reported in the previous papers. The present paper deals with the confirmation of hexosamines in the style.

8.59 BIOCHEMICAL STUDIES ON PTERIA (PINCTADA) MARTENSII AND HYRIOPSIS SCHLEGELII

Horiguchi, Yoshishige
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 8, 463-466 (1956) (English synopsis and tables)

II. Separation of crude sulfomucopolysaccharides from various tissues of Pteria (Pinctada) martensii and Hyriopsis schlegelii. -- The amounts of crude sulfomucopolysaccharides were about 36 percent in dried matter of mantle mucilage, 8.7 percent in adductor muscle, and less than 3 percent in other organs of Pteria (Pinctada) martensii, and 13.6 percent in mantle, 12.5 percent in viscera, etc., and less than 1 percent in gill of Hyriopsis schlegelii, respectively.

8.64 THE VITAMIN B_6 CONTENT OF FISH MEAT

Yanase, Masaki
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 1, 51-55 (1956) (English abstract and tables)

8.64 STUDIES ON THE VITAMIN B GROUP (B_1, B_2, B_6, AND B_{12}) IN THE PYLORIC APPENDAGES OF FISHES

Murayama, Shigeo and Tabei, Kikuko
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 2, 136-141 (1956) (English abstract and tables)

8.64 STUDIES ON B-VITAMINS IN PYLORIC CAECA OF SKIPJACK

Kakimoto, Daiichi and Kanazawa, Akio
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 9, 574-582 (1956) (English synopsis, figures, and tables)

I. Thiamine, nicotinic acid, folic acid, biotin and pantothenic acid.
II. P-aminobenzoic acid (PABA) and riboflavin.

9.14 AN AMINO ACID TEST DIET FOR SALMON

Halver, John E. (Salmon Nutrition Laboratory, U. S. Fish and Wildlife Service, Cook, Washington)
Federation Proceedings 15, 554 (March 1956)

An amino acid test diet for chinook salmon (Oncorhynchus tshawytscha) was developed which contained (in %) L-amino acid mix 35, carboxymethyl-cellulose 5, dextrin 3, corn oil 2.5, minerals 2, alpha cellulose + vitamins 1.5, cod-liver oil 1, and water 50.

9.14 PROTEIN REQUIREMENTS OF CHINOOK SALMON AT TWO WATER TEMPERATURES

DeLong, Donald C.; Halver, John E.; and Mertz, Edwin T.
Federation Proceedings 16, Part 1, 384 (March 1957)

Data suggest that the ability of salmon to utilize dietary protein for growth is a function of environmental temperature, higher water temperature permitting more efficient utilization of high protein diets.

9.2 YEARBOOK OF FISHERY STATISTICS, INTERNATIONAL TRADE

Anonymous
Yearbook of Fishery Statistics FAO 1952-53, 4, Part 2, 328 pp. (August 31, 1955)

(Abstract of this article appears under 1.01 page 1 - July 1957)

9.2 YEARBOOK OF FISHERY STATISTICS 1954-55, PRODUCTION AND FISHING CRAFT

Anonymous
FAO Yearbook of Fishery Statistics 5, Part 1, 249 pp. (1956)

(Abstract of this article appears under 1.01 page 3 - July 1957)

9.2 FISHERY STATISTICS OF THE UNITED STATES 1954

Anderson, A. W. and Power, E. A.
Statistical Digest 39, 374 pp. (1956) (United States Department of the Interior, Fish and Wildlife Service, Washington, D. C.)

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